**3GPP TSG-CT WG1 Meeting #133-eC1-217159**

**E-meeting, 11-19 November 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **24.501** | **CR** | **3813** | **rev** | **1** | **Current version:** | **17.4.1** |  |
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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 |  | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | Reference correction – Editorial |
|  |  |
| ***Source to WG:*** | NTT DOCOMO, vivo |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5GProtoc17 |  | ***Date:*** | 2021-11-16 |
|  |  |  |  |  |
| ***Category:*** | **D** |  | ***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)* |
|  |  |
| ***Reason for change:*** | There are 24 wrong references in TS 24.501. |
|  |  |
| ***Summary of change:*** | Fix references. |
|  |  |
| ***Consequences if not approved:*** | Wrong implementation due to wrong reference. |
|  |  |
| ***Clauses affected:*** | 3.1, 4.9.2, 5.3.1.5, 5.3.13A, 5.3.21, 5.4.4.3, 5.5.1.2.5, 5.5.1.2.5, 5.5.1.3.4, 5.5.1.3.5, 5.5.2.3.2, 5.6.1.5, 6.2.16, 9.11.4.20, 9.11.4.28, C.1, C.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## 3.1 Definitions

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

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

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

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

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

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

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

**5GS services:** Services provided by PS domain. Within the context of this specification, 5GS services is used as a synonym for EPS services.

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

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

**Access stratum connection:** A peer to peer access stratum connection:

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

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

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

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

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

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

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

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

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

**Aggregate maximum bit rate:** The maximum bit rate that limits the aggregate bit rate of a set of non-GBR bearers of a UE. Definition derived from 3GPP TS 23.501 [8].

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

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

**Applicable UE radio capability ID for the current UE radio configuration in the selected network:** The UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network if:

a) the UE supports RACS; and

b) the UE has:

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

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

**CAG cell:** A cell in which only members of the CAG can get normal service. Depending on local regulation, the CAG cell can provide emergency services also to subscribers who are not members of the CAG.

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

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

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

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

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

**Cleartext IEs:** Information elements that can be sent without confidentiality protection in initial NAS messages as specified in subclause 4.4.6.

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

**Control plane CIoT 5GS optimization:** Signalling optimizations to enable efficient transport of user data (IP, Ethernet, Unstructured or SMS) over control plane via the AMF including optional header compression of IP data and Ethernet data.

**DNN determined by the AMF:** If no DNN requested by the UE is provided, a DNN determined by the AMF based subscription information or local policy. Otherwise DNN determined by the AMF is the DNN requested by the UE.

**DNN requested by the UE:** A DNN explicitly requested by the UE and included in a NAS request message.

**DNN selected by the network:** If DNN replacement applies, a DNN selected and indicated to the AMF by PCF. Otherwise DNN selected by the network is the DNN determined by the AMF.

**Default S-NSSAI**: An S-NSSAI in the subscribed S-NSSAIs marked as default.

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

**User plane CIoT 5GS optimization:** Signalling optimizations to enable efficient transport of user data (IP, Ethernet or Unstructured) over the user plane.

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

**Registered for 5GS services with control plane CIoT 5GS optimization:** A UE supporting CIoT 5GS optimizations is registered for 5GS services, and control plane CIoT 5GS optimization along with one or more other CIoT 5GS optimizations have been accepted by the network.

**Registered** **for 5GS services with user plane CIoT 5GS optimization:** A UE supporting CIoT 5GS optimizations is registered for 5GS services, and user plane CIoT 5GS optimization along with one or more other CIoT 5GS optimizations have been accepted by the network.

**Registered** **for 5GS services with CIoT 5GS optimization:** A UE is registered for 5GS services with control plane CIoT 5GS optimization or registered for 5GS services with user plane CIoT 5GS optimization.

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

**Emergency PDU session:** A PDU session established with the request type "initial emergency request" or "existing emergency PDU session".

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

**Initial NAS message:** A NAS message is considered as an initial NAS message, if this NAS message can trigger the establishment of an N1 NAS signalling connection. For instance, the REGISTRATION REQUEST message is an initial NAS message.

**Initial registration for emergency services:** A registration performed with 5GS registration type "emergency registration" in the REGISTRATION REQUEST message.

**Initial registration for onboarding services in SNPN:** A registration performed with 5GS registration type "SNPN onboarding registration" in the REGISTRATION REQUEST message.

**Last visited registered TAI:** A TAI which is contained in the registration area that the UE registered to the network and which identifies the tracking area last visited by the UE.

**Mapped S-NSSAI:** An S-NSSAI in the subscribed S-NSSAIs for the HPLMN, which is mapped to an S-NSSAI of the registered PLMN in case of a roaming scenario.

**N1 mode:** A mode of a UE allowing access to the 5G core network via the 5G access network.

**Native 5G-GUTI:** A 5G-GUTI previously allocated by an AMF.

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

**Non-CAG Cell:** An NR cell which does not broadcast any Closed Access Group identity or an E-UTRA cell connected to 5GCN.

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

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

**In WB-N1 mode:** Indicates this paragraph applies only to a system which operates in WB-N1 mode. For a multi-access system this case applies if the system operates in N1 mode with E-UTRA connected to 5GCN, but not in NB-N1 mode.

**In WB-N1/CE mode:** Indicates this paragraph applies only when a UE, which is a CE mode B capable UE (see 3GPP TS 36.306 [25D]), is operating in CE mode A or B in WB-N1 mode.

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

**Initial small data rate control parameters for exception data:** Parameters corresponding to initial small data rate control parameters for small data rate control of exception data.

**N1 NAS signalling connection:** A peer to peer N1 mode connection between UE and AMF. An N1 NAS signalling connection is either the concatenation of an RRC connection via the Uu reference point and an NG connection via the N2 reference point for 3GPP access, or the concatenation of an IPsec tunnel via the NWu reference point and an NG connection via the N2 reference point for non-3GPP access.

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

**N6 PDU session:** A PDU session established between the UE and the User Plane Function (UPF) for transmitting the UE's IP data, Ethernet data or Unstructured data related to a specific application.

**NEF PDU session:** A PDU session established between the UE and the Network Exposure Function (NEF) for transmitting the UE's Unstructured data related to a specific application.

**Network slicing information:** information stored at the UE consisting of one or more of the following:

a) default configured NSSAI for PLMN or SNPN;

b) configured NSSAI for a PLMN or an SNPN;

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

d) pending NSSAI for a PLMN or an SNPN;

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

f) rejected NSSAI for the current PLMN or SNPN;

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

h) rejected NSSAI for the failed or revoked NSSAA;

and

i) for each access type:

1) allowed NSSAI for a PLMN or an SNPN;

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

3) rejected NSSAI for the current registration area;

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

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

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

**Non-cleartext IEs:** Information elements that are not cleartext IEs.

**Non-emergency PDU session:** Any PDU session which is not an emergency PDU session.

**Onboarding SUCI:** SUCI derived from onboarding SUPI.

**Onboarding SUPI:** SUPI derived by a UE in SNPN access mode, from default UE credentials and used to identify the UE during initial registration for onboarding services in SNPN and while registered for onboarding services in SNPN.

**PDU address:** An IP address assigned to the UE by the packet data network.

**PDU session for LADN:** A PDU session with a DNN associated with a LADN.

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

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

NOTE 2: An example of a persistent PDU session is a non-emergency PDU session with 5QI = 1 where there is a radio bearer associated with that context.

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

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

**Registered for emergency services:** A UE is considered as "registered for emergency services" when it has successfully completed initial registration for emergency services.

**Registered for onboarding services in SNPN:** A UE is considered as "registered for onboarding services in SNPN" when it has successfully completed initial registration for onboarding services in SNPN. While registered for onboarding services in SNPN, services other than the onboarding services are not available.

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

**Rejected NSSAI:** Rejected NSSAI for the current PLMN or SNPN, rejected NSSAI for the current registration area, rejected NSSAI for the failed or revoked NSSAA or rejected NSSAI for the maximum number of UEs reached.

NOTE 3: Rejected NSSAI for the current PLMN or SNPN, rejected NSSAI for the current registration area or rejected NSSAI for the maximum number of UEs reached contains a set of S-NSSAI(s) associated with a PLMN identity or SNPN identity for the current PLMN or SNPN and in roaming scenarios also contains a set of mapped HPLMN S-NSSAI(s) if available. Rejected NSSAI for the failed or revoked NSSAA only contains a set of S-NSSAI(s) associated with a PLMN identity or SNPN identity for the HPLMN or RSNPN.

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

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

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

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

**Local release:** Release of a PDU session without peer-to-peer signalling between the network and the UE.

NOTE 4: Local release can include communication among network entities.

**Removal of eCall only mode restriction:** All the limitations as described in 3GPP TS 22.101 [2] for the eCall only mode do not apply any more.

**SNPN access operation mode**: SNPN access mode or access to SNPN over non-3GPP access.

NOTE 5: The term "non-3GPP access" in an SNPN refers to the case where the UE is accessing SNPN services via a PLMN.

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

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

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

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

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

**UE using 5GS services with control plane CIoT 5GS optimization:** AUE that is registered for 5GS services with the control plane CIOT 5GS optimization accepted by the network.

**User-plane resources:** Resources established between the UE and the UPF. The user-plane resources consist of one of the following:

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

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

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

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

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

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

**W-AGF acting on behalf of the N5GC device:** A W-AGF that enables an N5GC device behind a 5G-CRG or an FN-CRG to connect to the 5G Core.

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

**Non-public network**

**Disaster Roaming**

**satellite NG-RAN**

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

**5G-GUTI**

**5G-S-TMSI**

**5G-TMSI**

**Global Line Identifier (GLI)**

**Global Cable Identifier (GCI)**

**GUAMI**

**IMEI**

**IMEISV**

**IMSI**

**PEI**

**SUPI**

**SUCI**

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

**CAG selection**

**Country**

**EHPLMN**

**HPLMN**

**Onboarding services in SNPN**

**Registered SNPN**

**Selected PLMN**

**Selected SNPN**

**Shared network**

**SNPN identity**

**Steering of Roaming (SOR)**

**Steering of roaming connected mode control information (SOR-CMCI)**

**Steering of Roaming information**

**Subscribed SNPN**

**Suitable cell**

**VPLMN**

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

**eCall over IMS**

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

**SRVCC**

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

**eCall only mode**

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

**5G access network**

**5G core network**

**5G QoS flow**

**5G QoS identifier**

**5G-RG**

**5G-BRG**

**5G-CRG**

**5G System**

**Allowed area**

**Allowed NSSAI**

**AMF region**

**AMF set**

**Closed access group**

**Configured NSSAI**

**Credentials Holder (CH)**

**Default UE credentials**

**IAB-node**

**Local area data network**

**Multi-USIM UE**

**Network identifier (NID)**

**Network slice**

**NG-RAN**

**Non-allowed area**

**Onboarding Standalone Non-Public Network**

**PDU session**

**PDU session type**

**Pending NSSAI**

**Requested NSSAI**

**Routing Indicator**

**Service data flow**

**Service Gap Control**

**Serving PLMN rate control**

**Small data rate control status**

**SNPN access mode**

**SNPN enabled UE**

**Stand-alone Non-Public Network**

**Time Sensitive Communication**

**Time Sensitive Communication and Time Synchronization Function**

**UE-DS-TT residence time**

**UE presence in LADN service area**

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

**UE local configuration**

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

**GMM**

**MM**

**A/Gb mode**

**Iu mode**

**GPRS**

**Non-GPRS**

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

**CIoT EPS optimization**

**Control plane CIoT EPS optimization**

**EENLV**

**EMM**

**EMM-DEREGISTERED**

**EMM-DEREGISTERED-INITIATED**

**EMM-IDLE mode**

**EMM-NULL**

**EMM-****REGISTERED**

**EMM-REGISTERED-INITIATED**

**EMM-SERVICE-REQUEST-INITIATED**

**EMM-TRACKING-AREA-UPDATING-INITIATED**

**EPS**

**EPS security context**

**EPS services**

**Lower layer failure**

**Megabit**

**Message header**

**NAS signalling connection recovery**

**NB-S1 mode**

**Non-EPS services**

**S1 mode**

**User plane CIoT EPS optimization**

**WB-S1 mode**

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

**5G security context**

**5G NAS security context**

**ABBA**

**Current 5G NAS security context**

**Full native 5G NAS security context**

**K'**AME

**K**AMF

**K**ASME

**Mapped 5G NAS security context**

**Mapped security context**

**Native 5G NAS security context**

**NCC**

**Non-current 5G NAS security context**

**Partial native 5G NAS security context**

**RES\***

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

**NG connection**

**User Location Information**

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

**E-UTRA-PC5**

**NR-PC5**

**V2X**

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

**3GPP UAV ID**

**CAA (Civil Aviation Administration)-Level UAV Identity**

**Command and Control (C2) Communication**

**UAV controller (UAV-C)**

**UAS Services**

**UAS Service Supplier (USS)**

**Uncrewed Aerial System (UAS)**

**USS communication**

**UUAA**

**UUAA-MM**

**UUAA-SM**

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

**ProSe**

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

**Edge Application Server**

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

### 4.9.2 Disabling and re-enabling of UE's N1 mode capability for 3GPP access

The UE shall only disable the N1 mode capability for 3GPP access when in 5GMM-IDLE mode.

When the UE is disabling the N1 mode capability for 3GPP access for a PLMN not due to redirection to EPC, it should proceed as follows:

a) select an E-UTRA cell connected to EPC of the registered PLMN or a PLMN from the list of equivalent PLMNs, if the UE supports S1 mode and the UE has not disabled its E-UTRA capability as specified in 3GPP TS 24.301 [15];

b) if an E-UTRA cell connected to EPC of the registered PLMN or a PLMN from the list of equivalent PLMNs cannot be found, the UE does not support S1 mode or the UE has disabled its E-UTRA capability as specified in 3GPP TS 24.301 [15], the UE may select another RAT of the registered PLMN or a PLMN from the list of equivalent PLMNs that the UE supports;

c) if another RAT of the registered PLMN or a PLMN from the list of equivalent PLMNs cannot be found, or the UE does not have a registered PLMN, then enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform PLMN selection as specified in 3GPP TS 23.122 [5]. If disabling of the N1 mode capability for 3GPP access was not due to a UE-initiated de-registration procedure for 5GS services over 3GPP access not due to switch-off, the UE may re-enable the N1 capability for this PLMN selection. As an implementation option, if the UE does not have a registered PLMN, instead of performing PLMN selection, the UE may select another RAT of the selected PLMN if the UE has chosen a PLMN and the RAT is supported by the UE; or

d) if no other allowed PLMN and RAT combinations are available, then the UE may re-enable the N1 mode capability for 3GPP access and indicate to lower layers to remain camped in NG-RAN of the registered PLMN, and may periodically scan for another PLMN and RAT combination which can provide EPS services or non-EPS services (if the UE supports EPS services or non-EPS services). How this periodic scanning is done, is UE implementation dependent.

When the UE is disabling the N1 mode capability for 3GPP access for an SNPN, it should proceed as follows:

a) enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform SNPN selection as specified in 3GPP TS 23.122 [5]. If disabling of the N1 mode capability for 3GPP access was not due to a UE-initiated de-registration procedure for 5GS services over 3GPP access not due to switch-off, the UE may re-enable the N1 capability for this SNPN selection; or

b) if no other SNPN is available, then the UE may re-enable the N1 mode capability for 3GPP access and indicate to lower layers to remain camped in NG-RAN of the registered SNPN.

When the UE is disabling the N1 mode capability upon receiving cause value #31 "Redirection to EPC required" as specified in subclauses 5.5.1.2.5, 5.5.1.3.5 and 5.6.1.5, it should proceed as follows:

a) If the UE is in NB-N1 mode:

1) if lower layers do not provide an indication that the current E-UTRA cell is connected to EPC or lower layers do not provide an indication that the current E-UTRA cell supports CIoT EPS optimizations that are supported by the UE, search for a suitable NB-IoT cell connected to EPC according to 3GPP TS 36.304 [25C];

2) if lower layers provide an indication that the current E-UTRA cell is connected to EPC and the current E-UTRA cell supports CIoT EPS optimizations that are supported by the UE, perform a core network selection to select EPC as specified in subclause 4.8.4A.1; or

3) if lower layers cannot find a suitable NB-IoT cell connected to EPC or there is no suitable NB-IoT cell connected to EPC which supports CIoT EPS optimizations that are supported by the UE, the UE, as an implementation option, may indicate to lower layers to remain camped in E-UTRA cell connected to 5GCN, may then start an implementation-specific timer and enter the state 5GMM-REGISTERED.LIMITED-SERVICE. The UE may may re-enable the N1 mode capability for 3GPP access at expiry of the implementation-specific timer, if the timer had been started, and may then proceed with the appropriate 5GMM procedure.

b) If the UE is in WB-N1 mode:

1) if lower layers do not provide an indication that the current E-UTRA cell is connected to EPC or lower layers do not provide an indication that the current E-UTRA cell supports CIoT EPS optimizations that are supported by the UE, search for a suitable E-UTRA cell connected to EPC according to 3GPP TS 36.304 [25C];

2) if lower layers provide an indication that the current E-UTRA cell is connected to EPC and the current E-UTRA cell supports CIoT EPS optimizations that are supported by the UE, then perform a core network selection to select EPC as specified in subclause 4.8.4A.1; or

3) if lower layers cannot find a suitable E-UTRA cell connected to EPC or there is no suitable E-UTRA cell connected to EPC which supports CIoT EPS optimizations that are supported by the UE, the UE, as an implementation option, may indicate to lower layers to remain camped in E-UTRA cell connected to 5GCN, may then start an implementation-specific timer and enter the state 5GMM-REGISTERED.LIMITED-SERVICE. The UE may re-enable the N1 mode capability for 3GPP access at expiry of the implementation-specific timer, if the timer had been started, and may then proceed with the appropriate 5GMM procedure.

When the UE supporting both N1 mode and S1 mode needs to stay in E-UTRA connected to EPC (e.g. due to the domain selection for UE originating sessions as specified in subclause 4.3.2), in order to prevent unintentional handover or cell reselection from E-UTRA connected to EPC to NG-RAN connected to 5GCN, the UE operating in single-registration mode shall disable the N1 mode capability for 3GPP access and:

a) shall set the N1mode bit to "N1 mode not supported" in the UE network capability IE (see 3GPP TS 24.301 [15]) of the ATTACH REQUEST message and the TRACKING AREA UPDATE REQUEST message in EPC; and

b) the UE NAS layer shall indicate the access stratum layer(s) of disabling of the N1 mode capability for 3GPP access.

If the UE is required to disable the N1 mode capability for 3GPP access and select E-UTRA or another RAT, and the UE is in the 5GMM-CONNECTED mode,

- if the UE has a persistent PDU session, then the UE waits until the radio bearer associated with the persistent PDU session has been released;

- otherwise the UE shall locally release the established NAS signalling connection;

and enter the 5GMM-IDLE mode before selecting E-UTRA or another RAT.

If the UE is disabling its N1 mode capability for 3GPP access before selecting E-UTRA or another RAT, the UE shall not perform the UE-initiated de-registration procedure of subclause 5.5.2.2.

The UE shall re-enable the N1 mode capability for 3GPP access when the UE performs PLMN or SNPN selection over 3GPP access, unless

- disabling of the N1 mode capability for 3GPP access was due to a UE-initiated de-registration procedure for 5GS services over 3GPP access not due to switch-off; or

- the UE has already re-enabled the N1 mode capability for 3GPP access when performing items c) or d) above.

If the disabling of N1 mode capability for 3GPP access was due to IMS voice is not available over 3GPP access and the UE's usage setting is "voice centric", the UE shall re-enable the N1 mode capability for 3GPP access when the UE's usage setting is changed from "voice centric" to "data centric", as specified in subclauses 4.3.3.

The UE should memorize the identity of the PLMN or SNPN where N1 mode capability for 3GPP access was disabled and should use that stored information in subsequent PLMN or SNPN selections as specified in 3GPP TS 23.122 [5].

If the disabling of N1 mode capability for 3GPP access was due to successful completion of an emergency services fallback, the criteria to enable the N1 mode capability again are UE implementation specific.

The UE shall disable the N1 mode capability for 3GPP access if requested by the upper layers (e.g. see subclause U.2.2.6.4 in 3GPP TS 24.229 [14]). If the UE disabled the N1 mode capability for 3GPP access based on the request from the upper layers (e.g. see subclause U.2.2.6.4 in 3GPP TS 24.229 [14]), the criteria to re-enable the N1 mode capability for 3GPP access after the completion of an emergency service are UE implementation specific.

If the N1 mode capability for 3GPP access was disabled due to the UE initiated de-registration procedure for 3GPP access or for 3GPP access and non-3GPP access and the UE is operating in single-registration mode (see subclause 5.5.2.2.3), upon request of the upper layers to re-register for 5GS services over 3GPP access the UE shall enable the N1 mode capability for 3GPP access again.

As an implementation option, the UE may start a timer for enabling the N1 mode capability for 3GPP access when the UE's registration attempt counter reaches 5 and the UE disables the N1 mode capability for 3GPP access for cases described in subclauses 5.5.1.2.7 and 5.5.1.3.7. The UE should memorize the identity of the PLMNs where N1 mode capability for 3GPP access was disabled. On expiry of this timer:

- if the UE is in Iu mode or A/Gb mode and is in idle mode as specified in 3GPP TS 24.008 [12] on expiry of the timer, the UE should enable the N1 mode capability for 3GPP access;

- if the UE is in Iu mode and a PS signalling connection exists, but no RR connection exists, the UE may abort the PS signalling connection before enabling the N1 mode capability for 3GPP access; and

- if the UE is in S1 mode and is in EMM-IDLE mode as specified in 3GPP TS 24.301 [15], on expiry of the timer, the UE should enable the N1 mode capability for 3GPP access.

If the UE is in Iu mode or A/Gb mode and an RR connection exists, the UE should delay enabling the N1 mode capability for 3GPP access until the RR connection is released. If the UE is in S1 mode and is in EMM-CONNECTED mode as specified in 3GPP TS 24.301 [15], the UE should delay enabling the N1 mode capability for 3GPP access until the NAS signalling connection in S1 mode is released.

The UE may disable the N1 mode capability for currently camped PLMN or SNPN over 3GPP access (see 3GPP TS 23.122 [5]) if no network slice is available for the camped PLMN or SNPN.

If the UE attempts to establish an emergency PDU session in a PLMN where N1 mode capability was disabled due to the UE's registration attempt counter have reached 5, the UE may enable N1 mode capability for that PLMN memorized by the UE.

NOTE: If N1 mode capability is disabled due to the UE's registration attempt counter reaches 5, the value of the timer for re-enabling N1 mode capability is recommended to be the same as the value of T3502 which follows the handling specified in subclause 5.3.8.

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

#### 5.3.1.5 Suspend and resume of the N1 NAS signalling connection

Suspend of the N1 NAS signalling connection can be initiated by the network in 5GMM-CONNECTED mode when user plane CIoT 5GS optimization is used. Resume of the suspended N1 NAS signalling connection is initiated by the UE.

In the UE, when user plane CIoT 5GS optimization is used:

- Upon idle suspend indication from the lower layers, the UE shall enter 5GMM-IDLE mode with suspend indication, shall not consider the N1 NAS signalling connection released and shall not consider the secure exchange of NAS messages terminated (see subclause 4.4.2.5 and 4.4.5).

- Upon trigger of a procedure using an initial NAS message when in 5GMM-IDLE mode with suspend indication, the UE shall:

i) if the initial NAS message is a REGISTRATION REQUEST message with the NG-RAN-RCU bit of the 5GS update type IE set to "UE radio capability update needed", enter 5GMM-IDLE mode without suspend indication and proceed with the registration procedure; or

ii) otherwise, request the lower layer to resume the RRC connection.

NOTE 1: In NB-N1 mode, in the request to the lower layer the data volume information of the initial NAS message is provided to the lower layers. Interactions between the NAS and the lower layers in order to obtain the data volume information of the initial NAS message (see 3GPP TS 36.321 [25E], 3GPP TS 36.331 [25A]) is left to implementations.

- Upon indication from the lower layers that the RRC connection has been resumed when in 5GMM-IDLE mode with suspend indication, the UE shall enter 5GMM-CONNECTED mode. If the pending NAS message is:

i) a SERVICE REQUEST message, the service type IE is not set to "emergency services fallback", and the UE did not include the NAS message container IE in the SERVICE REQUEST message; or

ii) a CONTROL PLANE SERVICE REQUEST message, and the UE did not include the CIoT small data container IE or the NAS message container IE in the CONTROL PLANE SERVICE REQUEST message,

the message shall not be sent. Otherwise the UE shall cipher the message as specified in subclause 4.4.5 and send the pending initial NAS message upon entering 5GMM-CONNECTED mode;

NOTE 2: If a NAS message is discarded and not sent to the network, the uplink NAS COUNT value corresponding to that message is reused for the next uplink NAS message to be sent.

- Upon fallback indication from the lower layers at RRC connection resume when in 5GMM-IDLE mode with suspend indication, the UE shall enter 5GMM-IDLE mode without suspend indication, send any pending initial NAS message and proceed as if RRC connection establishment had been requested;

- Upon indication from the lower layers that the RRC connection resume has failed and indication from the lower layers that the RRC connection is suspended, the UE shall enter 5GMM-IDLE mode with suspend indication and restart the ongoing NAS procedure if required; and

- Upon indication from the lower layers that the RRC connection resume has failed and indication from the lower layers that the RRC connection is not idle suspended, the UE shall enter 5GMM-IDLE mode without suspend indication and restart the ongoing NAS procedure if required.

In the network, when user plane CIoT 5GS optimization is used:

- Upon idle suspend indication from the lower layers, the network shall enter 5GMM-IDLE mode with suspend indication, shall not consider the N1 NAS signalling connection released and shall not consider the secure exchange of NAS messages terminated; and

- Upon indication from the lower layers that the RRC connection has been resumed when in 5GMM-IDLE mode with suspend indication, the network shall enter 5GMM-CONNECTED mode.

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

### 5.3.13A Forbidden PLMN lists

In N1 mode, two lists of forbidden PLMN are managed independently per access type, i.e., 3GPP access or non-3GPP access:

- the list of "forbidden PLMNs" as defined in 3GPP TS 23.122 [5] is applicable for 3GPP access in N1 mode. The same list is used by 5GMM for 3GPP access, EMM, GMM and MM (see 3GPP TS 24.301 [15] and 3GPP TS 24.008 [12]), regardless whether the UE is operating in single-registration mode or dual-registration mode.

- the list of "forbidden PLMNs for non-3GPP access to 5GCN" as defined in 3GPP TS 24.502 [18] is applicable for 5GMM for non-3GPP access.

The list of "forbidden PLMNs for GPRS service" as defined in 3GPP TS 23.122 [5] and 3GPP TS 24.008 [12] is applicable for 3GPP access in N1 mode. The same list is used by 5GMM for 3GPP access, EMM and GMM (see 3GPP TS 24.301 [15] and 3GPP TS 24.008 [12]), regardless whether the UE is operating in single-registration mode or dual-registration mode.

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

### 5.3.21 CIoT 5GS optimizations

CIoT 5GS optimizations provide improved support of small data and SMS transfer. A UE supporting CIoT 5GS optimizations can indicate the 5GS CIoT network behaviour the UE can support and prefers to use during the registration procedure (see 3GPP TS 23.502 [9]). The UE may indicate the support for control plane CIoT 5GS optimization, user plane CIoT 5GS optimization, N3 data transfer and header compression (see subclause 9.11.3.1). Furthermore, the UE may, separately from the indication of support, indicate preference for control plane CIoT 5GS optimization or user plane CIoT 5GS optimization (see subclause 9.11.3.9A). The indication of preference is also considered as the request to use. A UE supporting CIoT EPS optimizations can also indicate the EPS CIoT network behaviour the UE can support during the registration procedure. Furthermore, the UE may, separately from the indication of support, indicate preference for control plane CIoT EPS optimization or user plane CIoT EPS optimization.

NOTE 1: CIoT 5GS optimizations are not supported by NR connected to 5GCN.

NOTE 2: If the UE does not support user plane CIoT 5GS optimization, it does not indicate preference for user plane CIoT 5GS optimization.

The UE can be in NB-N1 mode or WB-N1 mode when requesting the use of CIoT 5GS optimizations during the registration procedure. A UE in NB-N1 mode always indicates support for control plane CIoT 5GS optimization.

In NB-N1 mode, the UE, when requesting the use of CIoT 5GS optimizations, does not:

- request an initial registration for emergency services;

- request a PDU session establishment for emergency PDU session; or

- indicate UE's usage setting during the registration procedure.

The network does not indicate to the UE support of emergency services when the UE is in NB-N1 mode (see subclause 5.5.1.2.4 and 5.5.1.3.4).

The control plane CIoT 5GS optimization enables support of efficient transport of user data (IP, Ethernet and Unstructured) or SMS messages over control plane via the AMF without triggering user-plane resources establishment. The support of control plane CIoT 5GS optimization is mandatory for the network in NB-N1 mode and optional in WB-N1 mode. Optional header compression of IP data and Ethernet data can be applied to PDU sessions with IP PDU session type and Ethernet PDU session type that are configured to support header compression. For IP header compression, Robust Header Compression (ROHC) protocol specified in IETF RFC 5795 [39B] is used. For Ethernet header compression, Ethernet Header Compression (EHC) protocol specified in 3GPP TS 38.323 [29] is used.

For a UE that supports Location Services (LCS) notification mechanisms in N1 mode, the control plane CIoT 5GS optimization also enables the transport of location services messages from 5GMM-IDLE mode using the CONTROL PLANE SERVICE REQUEST message when location services are requested (see subclause 6.7.1 in 3GPP TS 23.273 [6B]).

The user plane CIoT 5GS optimization enables support for change from 5GMM-IDLE mode over 3GPP access to 5GMM-CONNECTED mode over 3GPP access without the need for using the service request procedure (see subclause 5.3.1.5).

If the UE supports user plane CIoT 5GS optimization, it shall also support N3 data transfer.

If the UE indicates support of one or more CIoT 5GS optimizations and the network supports one or more CIoT 5GS optimizations and decides to accept the registration request, the network indicates the supported CIoT 5GS optimizations to the UE per registration area when accepting the UE request. Network indication of support is interpreted by the UE as the acceptance to use the respective feature. After completion of the registration procedure, the UE and the network can then use the accepted CIoT 5GS optimizations for the transfer of user data (IP, Ethernet, Unstructured and SMS).

A UE in NB-N1 mode or WB-N1 mode can request the use of SMS over NAS by setting the SMS requested bit of the 5GS update type IE in the REGISTRATION REQUEST message as specified in subclauses 5.5.1.2.2 and 5.5.1.3.2.

The AMF indicates whether it allows the use of SMS over NAS for a UE in NB-N1 mode or WB-N1 mode by setting the SMS allowed bit of the 5GS registration result IE in the REGISTRATION ACCEPT message as specified in subclauses 5.5.1.2.4 and 5.5.1.3.4.

If the UE and the network support both the control plane CIoT 5GS optimization and N3 data transfer, then when receiving the UE's request for a PDU session establishment, the AMF decides whether the PDU session should be NEF PDU session or N6 PDU session as specified in 3GPP TS 23.501 [8] and then:

a) if NEF PDU session is to be established for unstructured data type, the AMF includes control plane only indication for the requested PDU session to the SMF;

b) if N6 PDU session is to be established and the DNN or S-NSSAI of the newly requested N6 PDU session supports interworking with EPS as specified in TS 23.502 [9]:

1) if there are existing N6 PDU sessions supporting interworking with EPS for this UE that were established with the control plane only indication, the AMF includes the control plane only indication for the newly requested N6 PDU session to the SMF; or

2) if there are existing N6 PDU sessions supporting interworking with EPS for this UE that were established without the control plane only indication, the AMF does not include the control plane only indication for the newly requested N6 PDU session to the SMF;

3) if there is no existing N6 PDU session supporting interworking with EPS for this UE, the AMF determines whether to include the control plane only indication for the newly requested N6 PDU session to the SMF based on local policies, the UE's preferred CIoT network behaviour and the supported CIoT network behaviour; and

c) if N6 PDU session is to be established and the DNN or S-NSSAI of the N6 PDU session does not support interworking with EPS as specified in TS 23.502 [9], the AMF determines whether to include the control plane only indication for the newly requested N6 PDU session to the SMF based on local policies, the UE's preferred CIoT network behaviour and the supported CIoT network behaviour.

In NB-N1 mode, if the UE or the network does not support N3 data transfer, then when receiving the UE's request for a PDU session establishment, the AMF decides whether the PDU session should be NEF PDU session or N6 PDU session as specified in 3GPP TS 23.501 [8] and then includes the control plane only indication for the requested PDU session to the SMF.

If the network supports user plane CIoT 5GS optimization, it shall also support N3 data transfer.

Broadcast system information may provide information about support of CIoT 5GS optimizations (see 3GPP TS 36.331 [25A]). At reception of new broadcast system information, the lower layers deliver it to the 5GMM layer in the UE. The information provided by lower layers is per PLMN and used by the UE to determine whether certain CIoT 5GS optimizations are supported in the cell.

The UE shall not attempt to use CIoT 5GS optimizations which are indicated as not supported.

In NB-N1 mode, at any given time, there cannot be user-plane resources established for a number of PDU sessions that exceeds the UE' s maximum number of supported user-plane resources. The UE in NB-N1 mode shall not:

a) request the establishment of user-plane resources for a number of PDU sessions that exceeds the UE' s maximum number of supported user-plane resources; or

b) initiate the establishment of a new PDU session, or request the transfer of a PDU session from the non-3GPP access to the 3GPP access, if:

1) the UE has indicated preference for user plane CIoT 5GS optimization;

2) the network accepted the use of user plane CIoT 5GS optimization; and

3) the UE currently has user-plane resources established fora number of PDU sessions that is equal to the UE' s maximum number of supported user-plane resources.

The AMF enforces a limit on the number of PDU sessions with active user-plane resources for a UE in NB-N1 mode based on the UE's maximum number of supported user-plane resources as follows:

a) there can be a maximum of one PDU session with active user-plane resources when the Multiple user-plane resources support bit is set to "Multiple user-plane resources not supported", or

b) there can be a maximum of two PDU sessions with active user-plane resources when the Multiple user-plane resources support bit is set to "Multiple user-plane resources supported".

A PDU session for a UE in NB-N1 mode shall only have one QoS rule and that is the default QoS rule. Reflective QoS is not supported in NB-N1 mode. Reflective QoS is not applicable for a PDU session with control plane only indication.

In NB-N1 mode, when the UE requests the lower layer to establish a RRC connection and the UE requests the use of user plane CIoT 5GS optimization, the UE shall pass an indication of the requested CIoT 5GS optimizations to the lower layers. If the UE requests the use of N3 data transfer without user plane CIoT 5GS optimization, then the UE shall also pass an indication of user plane CIoT 5GS optimization to lower layers.

In WB-N1 mode, when the UE requests the lower layer to establish a RRC connection and the UE requests the use of control plane CIoT 5GS optimization or user plane CIoT 5GS optimization, the UE shall pass an indication of the requested CIoT 5GS optimizations to the lower layers.

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

#### 5.4.4.3 Generic UE configuration update accepted by the UE

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

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

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

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

If the UE receives a new truncated 5G-S-TMSI configuration in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new truncated 5G-S-TMSI configuration as valid and the old truncated 5G-S-TMSI configuration as invalid; otherwise, the UE shall consider the old truncated 5G-S-TMSI configuration as valid.

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

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

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

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

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

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

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

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

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

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

If the UE receives the CAG information list IE in the CONFIGURATION UPDATE COMMAND message, the UE shall:

a) replace the "CAG information list" stored in the UE with the received CAG information list IE when received in the HPLMN or EHPLMN;

NOTE 1: When the UE receives the CAG information list IE in the HPLMN derived from the IMSI, the EHPLMN list is present and is not empty and the HPLMN is not present in the EHPLMN list, the UE behaves as if it receives the CAG information list IE in a VPLMN.

b) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 2: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

c) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

The UE shall store the "CAG information list" received in the CAG information list IE as specified in annex C.

If the received "CAG information list" includes an entry containing the identity of the current PLMN and the UE had set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message, the UE shall operate as follows.

a) If the UE receives the CONFIGURATION UPDATE COMMAND message via a CAG cell, the entry for the current PLMN in the received "CAG information list" does not include any of the CAG-ID(s) supported by the current CAG cell, and:

1) the entry for the current PLMN in the received "CAG information list" does not include an "indication that the UE is only allowed to access 5GS via CAG cells", then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"; or

2) the entry for the current PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and:

i) if the entry for the current PLMN in the received "CAG information list" includes one or more CAG-IDs, the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

ii) if the entry for the current PLMN in the received "CAG information list" does not include any CAG-ID and:

A) the UE does not have an emergency PDU session, then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

B) the UE has an emergency PDU session, then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE; or

b) If the UE receives the CONFIGURATION UPDATE COMMAND message via a non-CAG cell and the entry for the current PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and:

1) if the "allowed CAG list" for the current PLMN in the received "CAG information list" includes one or more CAG-IDs, the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

2) if the entry for the current PLMN in the received "CAG information list" does not include any CAG-ID and:

i) the UE does not have an emergency PDU session, then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

ii) the UE has an emergency PDU session, then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE.

If the received "CAG information list" does not include an entry containing the identity of the current PLMN and the UE receives the CONFIGURATION UPDATE COMMAND message via a CAG cell, the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list".

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

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

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

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

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

c) an Additional configuration indication IE is included, and:

1) "release of N1 NAS signalling connection not required" is indicated in the Signalling connection maintain request bit of the Additional configuration indication IE; and

2) a new allowed NSSAI, a new configured NSSAI and the Network slicing subscription change indication is not included in the CONFIGURATION UPDATE COMMAND message,

 the UE shall, after the completion of the generic UE configuration update procedure, start a registration procedure for mobility and registration update as specified in subclause 5.5.1.3; or

d) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested" is included, and:

1) the UE is not in NB-N1 mode;

2) a new allowed NSSAI, a new configured NSSAI or a Network slicing subscription change indication is not included; and

3) the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message,

 the UE shall, after the completion of the generic UE configuration update procedure, start a registration procedure for mobility and registration update as specified in subclause 5.5.1.3.

The UE receiving the rejected NSSAI in the CONFIGURATION UPDATE COMMAND message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

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

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

"S-NSSAI not available due to maximum number of UEs reached"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

Editor's note [WI: eNS-Ph2, CR#3417]: Whether "S-NSSAI not available due to maximum number of UEs reached" is applicable in an SNPN is FFS.

If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then the UE shall for each S-NSSAI behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running; and

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

If the UE receives a T3447 value IE in the CONFIGURATION UPDATE COMMAND message and has indicated "service gap control supported" in the REGISTRATION REQUEST, then the UE shall replace the stored T3447 value with the received value in the T3447 value IE, and if neither zero nor deactivated use the received T3447 value with the timer T3447 next time it is started. If the received T3447 value is zero or deactivated, then the UE shall stop the timer T3447 if running.

If the UE is not in NB-N1 mode, the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the CONFIGURATION UPDATE COMMAND message includes:

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested", the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription stored at the UE; or

b) a UE radio capability ID IE, the UE shall store the UE radio capability ID as specified in annex C.

If the UE is not currently registered for emergency services and the 5GS registration result IE value in the CONFIGURATION UPDATE COMMAND message is set to "Registered for emergency services", the UE shall consider itself registered for emergency services and shall locally release all non-emergency PDU sessions, if any.

If the UE receives the service-level-AA container IE of the CONFIGURATION UPDATE COMMAND message, the UE passes it to the upper layer.

Editor's note: It is FFS how to identify the application for which [service-level-AA container IE] is transferred.

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

##### 5.5.1.2.4 Initial registration accepted by the network

During a registration procedure with 5GS registration type IE set to "emergency registration", the AMF shall not check for mobility and access restrictions, regional restrictions or subscription restrictions, or CAG restrictions when processing the REGISTRATION REQUEST message.

If the initial registration request is accepted by the network, the AMF shall send a REGISTRATION ACCEPT message to the UE.

For each of the information elements: 5GMM capability, S1 UE network capability, and UE security capability, the AMF shall store all octets received from the UE in the REGISTRATION REQUEST message, up to the maximum length defined for the respective information element.

NOTE 1: This information is forwarded to the new AMF during inter-AMF handover or to the new MME during inter-system handover to S1 mode.

The AMF shall assign and include a TAI list as a registration area the UE is registered to in the REGISTRATION ACCEPT message. The AMF shall not assign a TAI list containing both tracking areas in NB-N1 mode and tracking areas not in NB-N1 mode. The UE, upon receiving a REGISTRATION ACCEPT message, shall delete its old TAI list and store the received TAI list. If the REGISTRATION REQUEST message was received over non-3GPP access, the AMF shall include a single TAI in the TAI list.

NOTE 2: The operator can allocate a TAI per non-3GPP access gateway and each non-3GPP access gateway is locally configured with its own TAI.

NOTE 3: When assigning the TAI list, the AMF can take into account the eNodeB's capability of support of CIoT 5GS optimization.

The AMF may include service area restrictions in the Service area list IE in the REGISTRATION ACCEPT message. The UE, upon receiving a REGISTRATION ACCEPT message with the service area restrictions shall act as described in subclause 5.3.5.

The AMF may also include a list of equivalent PLMNs in the REGISTRATION ACCEPT message. Each entry in the list contains a PLMN code (MCC+MNC). The UE shall store the list as provided by the network, and if the initial registration procedure is not for emergency services, the UE shall remove from the list any PLMN code that is already in the forbidden PLMN list as specified in subclause 5.3.13A. In addition, the UE shall add to the stored list the PLMN code of the registered PLMN that sent the list. The UE shall replace the stored list on each receipt of the REGISTRATION ACCEPT message. If the REGISTRATION ACCEPT message does not contain a list, then the UE shall delete the stored list.

If the initial registration procedure is not for emergency services, and if the PLMN identity of the registered PLMN is a member of the forbidden PLMN list as specified in subclause 5.3.13A, any such PLMN identity shall be deleted from the corresponding list(s).

If the Service area list IE is not included in the REGISTRATION ACCEPT message, any tracking area in the registered PLMN and its equivalent PLMN(s) in the registration area is considered as an allowed tracking area as described in subclause 5.3.5.

If the REGISTRATION REQUEST message contains the LADN indication IE, based on the LADN indication IE, UE subscription information, UE location and local configuration about LADN and:

- if the LADN indication IE includes requested LADN DNNs, the UE subscribed DNN list includes the requested LADN DNNs or the wildcard DNN, and the LADN service area of the requested LADN DNN has an intersection with the current registration area, the AMF shall determine the requested LADN DNNs included in the LADN indication IE as LADN DNNs for the UE;

- if no requested LADN DNNs included in the LADN indication IE and the wildcard DNN is included in the UE subscribed DNN list, the AMF shall determine the LADN DNN(s) configured in the AMF whose LADN service area has an intersection with the current registration area as LADN DNNs for the UE; or

- if no requested LADN DNNs included in the LADN indication IE and the wildcard DNN is not included in the UE subscribed DNN list, or if the UE subscribed DNN list does not include any of the DNN's in the LADN indication IE, the AMF shall determine the LADN DNN(s) included in the UE subscribed DNN list whose LADN service area has an intersection with the current registration area as LADN DNNs for the UE.

If the LADN indication IE is not included in the REGISTRATION REQUEST message, the AMF shall determine the LADN DNN(s) included in the UE subscribed DNN list whose service area has an intersection with the current registration area as LADN DNNs for the UE, except for the wildcard DNN included in the UE subscribed DNN list.

If the UE supports WUS assistance information and the AMF supports and accepts the use of WUS assistance information for the UE, then the AMF shall determine the negotiated UE paging probability information for the UE, store it in the 5GMM context of the UE, and if the UE is not performing the initial registration for emergency services, the AMF shall include it in the Negotiated WUS assistance information IE in the REGISTRATION ACCEPT message. The AMF may consider the UE paging probability information received in the Requested WUS assistance information IE when determining the negotiated UE paging probability information for the UE.

NOTE 4: Besides the UE paging probability information requested by the UE, the AMF can take local configuration or previous statistical information for the UE into account when determining the negotiated UE paging probability information for the UE.

The AMF shall include the LADN information which consists of the determined LADN DNNs for the UE and LADN service area(s) available in the current registration area in the LADN information IE of the REGISTRATION ACCEPT message.

The UE, upon receiving the REGISTRATION ACCEPT message with the LADN information, shall store the received LADN information. If there exists one or more LADN DNNs which are included in the LADN indication IE of the REGISTRATION REQUEST message and are not included in the LADN information IE of the REGISTRATION ACCEPT message, the UE considers such LADN DNNs as not available in the current registration area.

The 5G-GUTI reallocation shall be part of the initial registration procedure. During the initial registration procedure, if the AMF has not allocated a new 5G-GUTI by the generic UE configuration update procedure, the AMF shall include in the REGISTRATION ACCEPT message the new assigned 5G-GUTI together with the assigned TAI list.

If the UE has set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the AMF needs to update the "CAG information list" stored in the UE, the AMF shall include the CAG information list IE in the REGISTRATION ACCEPT message.

NOTE 5: The "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription.

If a 5G-GUTI or the SOR transparent container IE is included in the REGISTRATION ACCEPT message, the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

If the Operator-defined access category definitions IE, the Extended emergency number list IE or the CAG information list IE are included in the REGISTRATION ACCEPT message, the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

If the UE is not in NB-N1 mode and the UE has set the RACS bit to "RACS supported" in the 5GMM Capability IE of the REGISTRATION REQUEST message, the AMF may include either a UE radio capability ID IE or a UE radio capability ID deletion indication IE in the REGISTRATION ACCEPT message. If the UE radio capability ID IE or the UE radio capability ID deletion indication IE is included in the REGISTRATION ACCEPT message, the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The AMF shall include the MICO indication IE in the REGISTRATION ACCEPT message only if the MICO indication IE was included in the REGISTRATION REQUEST message, the AMF supports and accepts the use of MICO mode. If the AMF supports and accepts the use of MICO mode, the AMF may indicate "all PLMN registration area allocated" in the MICO indication IE in the REGISTRATION ACCEPT message. If "all PLMN registration area allocated" is indicated in the MICO indication IE, the AMF shall not assign and include the TAI list in the REGISTRATION ACCEPT message. If the REGISTRATION ACCEPT message included an MICO indication IE indicating "all PLMN registration area allocated", the UE shall treat all TAIs in the current PLMN as a registration area and delete its old TAI list. If "strictly periodic registration timer supported" is indicated in the MICO indication IE in the REGISTRATION REQUEST message, the AMF may indicate "strictly periodic registration timer supported" in the MICO indication IE in the REGISTRATION ACCEPT message.

The AMF shall include an active time value in the T3324 IE in the REGISTRATION ACCEPT message if the UE requested an active time value in the REGISTRATION REQUEST message and the AMF accepts the use of MICO mode and the use of active time.

The AMF shall include the T3512 value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent over the 3GPP access.

The AMF shall include the non-3GPP de-registration timer value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent over the non-3GPP access.

If the UE requests "control plane CIoT 5GS optimization" in the 5GS update type IE, indicates support of control plane CIoT 5GS optimization in the 5GMM capability IE and the AMF decides to accept the requested CIoT 5GS optimization and the registration request, the AMF shall indicate "control plane CIoT 5GS optimization supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message.

The AMF may include the T3447 value IE set to the service gap time value in the REGISTRATION ACCEPT message if:

- the UE has indicated support for service gap control in the REGISTRATION REQUEST message; and

- a service gap time value is available in the 5GMM context.

If there is a running T3447 timer in the AMF and the Follow-on request indicator is set to "Follow-on request pending" in the REGISTRATION REQUEST message, the AMF shall ignore the flag and proceed as if the flag was not received except for the following cases:

a) the UE is configured for high priority access in the selected PLMN; or

b) the 5GS registration type IE in the REGISTRATION REQUEST message is set to "emergency registration".

If the UE has indicated support for the control plane CIoT 5GS optimizations, and the AMF decides to activate the congestion control for transport of user data via the control plane, then the AMF shall include the T3448 value IE in the REGISTRATION ACCEPT message.

If:

- the UE in NB-N1 mode is using control plane CIoT 5GS optimization; and

- the network is configured to provide the truncated 5G-S-TMSI configuration for control plane CIoT 5GS optimizations;

the AMF shall include the Truncated 5G-S-TMSI configuration IE in the REGISTRATION ACCEPT message and set the "Truncated AMF Set ID value" and the "Truncated AMF Pointer value" in the Truncated 5G-S-TMSI configuration IE based on network policies. The AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

If the UE has included the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message, and if:

- the UE has a valid aerial UE subscription information;

- the UUAA procedure is to be performed during the registration procedure according to operator policy; and

- there is no valid UUAA result for the UE in the UE 5GMM context,

then the AMF shall initiate the UUAA-MM procedure with the UAS-NF as specified in TS 23.256 [6AB] and shall include a Service-level-AA pending indication IE in the REGISTRATION ACCEPT message. The AMF shall store in the UE 5GMM context that a UUAA procedure is pending. The AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

Editor's note: It is FFS when there is valid UUAA result for the UE in the UE 5GMM context

Editor's note: How to handle pending NSSAI during the registration procedure for UAS service is FFS.

Editor's note: It is FFS whether the Service-level-AA pending indication is included in the service-level AA container IE.

If the AMF determines that the UUAA-MM procedure needs to be performed for a UE, the AMF has not received the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message from the UE and the AMF decides to accept the UE to be registered for other services than UAS services based on the user's subscription data and the operator policy, the AMF shall accept the initial registration request and shall mark in the UE's 5GMM context that the UE is not allowed to request UAS services.

Upon receipt of the REGISTRATION ACCEPT message, the UE shall reset the registration attempt counter, enter state 5GMM-REGISTERED and set the 5GS update status to 5U1 UPDATED.

If the UE receives the REGISTRATION ACCEPT message from a PLMN, then the UE shall reset the PLMN-specific attempt counter for that PLMN for the specific access type for which the message was received. The UE shall also reset the PLMN-specific N1 mode attempt counter for that PLMN for the specific access type for which the message was received. If the message was received via 3GPP access, the UE shall reset the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "SIM/USIM considered invalid for non-GPRS services" events, if any. If the message was received via non-3GPP access, the UE shall reset the counter for "USIM considered invalid for 5GS services over non-3GPP" events.

If the UE receives the REGISTRATION ACCEPT message from an SNPN, then the UE shall reset the SNPN-specific attempt counter for the current SNPN for the specific access type for which the message was received. If the message was received via 3GPP access, the UE shall reset the counter for "the entry for the current SNPN considered invalid for 3GPP access" events. If the message was received via non-3GPP access, the UE shall reset the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events.

If the REGISTRATION ACCEPT message included a T3512 value IE, the UE shall use the value in the T3512 value IE as periodic registration update timer (T3512).

If the REGISTRATION ACCEPT message include a T3324 value IE, the UE shall use the value in the T3324 value IE as active timer (T3324).

If the REGISTRATION ACCEPT message included a non-3GPP de-registration timer value IE, the UE shall use the value in non-3GPP de-registration timer value IE as non-3GPP de-registration timer.

If the REGISTRATION ACCEPT message contained a 5G-GUTI, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the received 5G-GUTI, stop timer T3519 if running, and delete any stored SUCI. The UE shall provide the 5G-GUTI to the lower layer of 3GPP access if the REGISTRATION ACCEPT message is sent over the non-3GPP access, and the UE is in 5GMM-REGISTERED in both 3GPP access and non-3GPP access in the same PLMN.

If the REGISTRATION ACCEPT message contains the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed", or contains a configured NSSAI IE with a new configured NSSAI for the current PLMN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the successful update of the network slicing information.

If the REGISTRATION ACCEPT message contains the CAG information list IE and the UE had set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message, the UE shall:

a) replace the "CAG information list" stored in the UE with the received CAG information list IE when received in the HPLMN or EHPLMN;

NOTE 6: When the UE receives the CAG information list IE in the HPLMN derived from the IMSI, the EHPLMN list is present and is not empty and the HPLMN is not present in the EHPLMN list, the UE behaves as if it receives the CAG information list IE in a VPLMN.

b) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 7: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

c) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

The UE shall store the "CAG information list" received in the CAG information list IE as specified in annex C.

If the received "CAG information list" includes an entry containing the identity of the registered PLMN, the UE shall operate as follows:

a) if the UE receives the REGISTRATION ACCEPT message via a CAG cell, the entry for the registered PLMN in the received "CAG information list" does not include any of the CAG-ID(s) supported by the current CAG cell, and:

1) the entry for the registered PLMN in the received "CAG information list" does not include an "indication that the UE is only allowed to access 5GS via CAG cells", then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"; or

2) the entry for the registered PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and:

i) if the entry for the registered PLMN in the received "CAG information list" includes one or more CAG-IDs, the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

ii) if the entry for the registered PLMN in the received "CAG information list" does not include any CAG-ID and:

A) the UE does not have an emergency PDU session, then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

B) the UE has an emergency PDU session, then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE; or

b) if the UE receives the REGISTRATION ACCEPT message via a non-CAG cell and the entry for the registered PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and:

1) if the "allowed CAG list" for the registered PLMN in the received "CAG information list" includes one or more CAG-IDs, the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

2) if the entry for the registered PLMN in the received "CAG information list" does not include any CAG-ID and:

i) the UE does not have an emergency PDU session, then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

ii) the UE has an emergency PDU session, then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE.

If the received "CAG information list" does not include an entry containing the identity of the registered PLMN and the UE receives the REGISTRATION ACCEPT message via a CAG cell, the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list".

If the REGISTRATION ACCEPT message contains the Operator-defined access category definitions IE, the Extended emergency number list IE or the CAG information list IE, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the operator-defined access category definitions, the extended local emergency numbers list or the "CAG information list".

If the REGISTRATION ACCEPT message contains the UE radio capability ID IE or the UE radio capability ID deletion indication IE, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the UE radio capability ID IE or the UE radio capability ID deletion indication IE.

Upon receiving a REGISTRATION COMPLETE message, the AMF shall stop timer T3550 and change to state 5GMM-REGISTERED. The 5G-GUTI, if sent in the REGISTRATION ACCEPT message, shall be considered as valid, and the UE radio capability ID, if sent in the REGISTRATION ACCEPT, shall be considered as valid.

If the 5GS update type IE was included in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS supported", and SMSF selection is successful, then the AMF shall send the REGISTRATION ACCEPT message after the SMSF has confirmed that the activation of the SMS service was successful. When sending the REGISTRATION ACCEPT message, the AMF shall:

a) set the SMS allowed bit of the 5GS registration result IE to "SMS over NAS allowed" in the REGISTRATION ACCEPT message, if the UE has set the SMS requested bit of the 5GS update type IE to "SMS over NAS supported" in the REGISTRATION REQUEST message and the network allows the use of SMS over NAS for the UE; and

b) store the SMSF address and the value of the SMS allowed bit of the 5GS registration result IE in the UE 5GMM context and consider the UE available for SMS over NAS.

If:

a) the SMSF selection in the AMF is not successful;

b) the SMS activation via the SMSF is not successful;

c) the AMF does not allow the use of SMS over NAS;

d) the SMS requested bit of the 5GS update type IE was set to "SMS over NAS not supported" in the REGISTRATION REQUEST message; or

e) the 5GS update type IE was not included in the REGISTRATION REQUEST message;

then the AMF shall set the SMS allowed bit of the 5GS registration result IE to "SMS over NAS not allowed" in the REGISTRATION ACCEPT message.

When the UE receives the REGISTRATION ACCEPT message, if the UE is also registered over another access to the same PLMN, the UE considers the value indicated by the SMS allowed bit of the 5GS registration result IE as applicable for both accesses over which the UE is registered.

The AMF shall include the 5GS registration result IE in the REGISTRATION ACCEPT message. If the 5GS registration result IE value indicates:

a) "3GPP access", the UE:

- shall consider itself as being registered to 3GPP access only; and

- if in 5GMM-REGISTERED state over non-3GPP access and on the same PLMN as 3GPP access, shall enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION over non-3GPP access and set the 5GS update status to 5U2 NOT UPDATED over non-3GPP access;

b) "Non-3GPP access", the UE:

- shall consider itself as being registered to non-3GPP access only; and

- if in the 5GMM-REGISTERED state over 3GPP access and is on the same PLMN as non-3GPP access, shall enter the state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION over 3GPP access and set the 5GS update status to 5U2 NOT UPDATED over 3GPP access; or

c) "3GPP access and Non-3GPP access", the UE shall consider itself as being registered to both 3GPP access and non-3GPP access.

The AMF shall include the allowed NSSAI for the current PLMN and shall include the mapped S-NSSAI(s) for the allowed NSSAI contained in the requested NSSAI from the UE if available, in the REGISTRATION ACCEPT message if the UE included the requested NSSAI in the REGISTRATION REQUEST message and the AMF allows one or more S-NSSAIs in the requested NSSAI.

The AMF may also include rejected NSSAI in the REGISTRATION ACCEPT message if the initial registration request is not for onboarding services in SNPN. If the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message, the rejected NSSAI shall be included in the Extended rejected NSSAI IE in the REGISTRATION ACCEPT message; otherwise the rejected NSSAI shall be included in the Rejected NSSAI IE in the REGISTRATION ACCEPT message. If the initial registration request is for onboarding services in SNPN, the AMF shall not include rejected NSSAI in the REGISTRATION ACCEPT message.

If the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message, the rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s); otherwise the rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s) with the following restrictions:

a) rejected NSSAI for the current PLMN or SNPN shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are not allowed; and

b) rejected NSSAI for the current registration area shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are not allowed.

NOTE 8: The UE that does not support extended rejected NSSAI can avoid requesting an S-NSSAI associated with a mapped S-NSSAI, which was included in the previous requested NSSAI but neither in the allowed NSSAI nor in the rejected NSSAI in the consequent registration procedures.

If the UE indicated the support for network slice-specific authentication and authorization, and if the Requested NSSAI IE includes one or more S-NSSAIs subject to network slice-specific authentication and authorization, the AMF shall in the REGISTRATION ACCEPT message include:

a) the allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s), if any:

1) which are not subject to network slice-specific authentication and authorization and are allowed by the AMF; or

2) for which the network slice-specific authentication and authorization has been successfully performed;

b) optionally, the rejected NSSAI;

c) pending NSSAI containing one or more S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing, and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing, if any; and

d) the "NSSAA to be performed" indicator in the 5GS registration result IE set to indicate that the network slice-specific authentication and authorization procedure will be performed by the network, if the allowed NSSAI is not included in the REGISTRATION ACCEPT message.

If the UE indicated the support for network slice-specific authentication and authorization, and if:

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

b) all subscribed S-NSSAIs marked as default are subject to network slice-specific authentication and authorization; and

c) the network slice-specific authentication and authorization procedure has not been successfully performed for any of the subscribed S-NSSAIs marked as default,

the AMF shall in the REGISTRATION ACCEPT message include:

a) the "NSSAA to be performed" indicator in the 5GS registration result IE to indicate that the network slice-specific authentication and authorization procedure will be performed by the network;

b) pending NSSAI containing one or more subscribed S-NSSAIs marked as default for which network slice-specific authentication and authorization will be performed or is ongoing and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any); and

c) optionally, the rejected NSSAI.

If the UE indicated the support for network slice-specific authentication and authorization, and if:

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed; and

b) one or more subscribed S-NSSAIs marked as default are not subject to network slice-specific authentication and authorization or the network slice-specific authentication and authorization procedure has been successfully performed for one or more subscribed S-NSSAIs marked as default;

the AMF shall in the REGISTRATION ACCEPT message include:

a) pending NSSAI containing one or more subscribed S-NSSAIs marked as default for which network slice-specific authentication and authorization will be performed or is ongoing (if any) and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any);

b) allowed NSSAI containing S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed;

c) allowed NSSAI containing one or more subscribed S-NSSAIs marked as default, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed; and

d) optionally, the rejected NSSAI.

If the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed, the allowed NSSAI shall not contain subscribed S-NSSAI(s) marked as default subject to NSAC.

When the REGISTRATION ACCEPT message includes a pending NSSAI, the pending NSSAI shall contain all S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing from the requested NSSAI of the REGISTRATION REQUEST message that was received over the 3GPP access, non-3GPP access, or both the 3GPP access and non-3GPP access.

If the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for one or more S-NSSAI(s) in the requested NSSAI as specified in subclause 4.6.2.5, the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the Extended rejected NSSAI IE in the REGISTRATION ACCEPT message. In addition, the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" included in the Extended rejected NSSAI IE of the REGISTRATION ACCEPT message.

If the UE does not indicate support for extended rejected NSSAI and the maximum number of UEs has been reached, the AMF should include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available in the current PLMN or SNPN" in the Rejected NSSAI IE and should not include these S-NSSAIs in the allowed NSSAI in the REGISTRATION ACCEPT message.

NOTE 9: Based on network policies, the AMF can include the S-NSSAI(s) for which the maximum number of UEs has been reached in the rejected NSSAI with rejection causes other than "S-NSSAI not available in the current PLMN or SNPN".

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

a) the REGISTRATION REQUEST message did not include the requested NSSAI and the initial registration request is not for onboarding services in SNPN;

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

c) the REGISTRATION REQUEST message included the requested NSSAI containing S-NSSAI(s) with incorrect mapped S-NSSAI(s); or

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

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

If the UE requests ciphering keys for ciphered broadcast assistance data in the REGISTRATION REQUEST message and the AMF has valid ciphering key data applicable to the UE's subscription and current tracking area, then the AMF shall include the ciphering key data in the Ciphering key data IE of the REGISTRATION ACCEPT message.

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

The UE that has indicated the support for network slice-specific authentication and authorization receiving the pending NSSAI in the REGISTRATION ACCEPT message shall store the S-NSSAI(s) in the pending NSSAI as specified in subclause 4.6.2.2. If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the UE shall store the received pending NSSAI for each of the equivalent PLMNs as specified in subclause 4.6.2.2. If the pending NSSAI is not included in the REGISTRATION ACCEPT message and the "NSSAA to be performed" indicator is not set to "Network slice-specific authentication and authorization is to be performed" in the 5GS registration result IE of the REGISTRATION ACCEPT message, then the UE shall delete the pending NSSAI for the current PLMN or SNPN and its equivalent PLMN(s), if existing, as specified in subclause 4.6.2.2.

The UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

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

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

"S-NSSAI not available due to maximum number of UEs reached"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

Editor's note [WI: eNS-Ph2, CR#3417]: Whether "S-NSSAI not available due to maximum number of UEs reached" is applicable in an SNPN is FFS.

If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then the UE shall for each S-NSSAI behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running; and

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

If the UE sets the NSSAA bit in the 5GMM capability IE to "Network slice-specific authentication and authorization not supported", and:

a) if the Requested NSSAI IE only includes the S-NSSAI(s) subject to network slice-specific authentication and authorization and one or more subscribed S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) marked as default which are not subject to network slice-specific authentication and authorization are available, the AMF shall in the REGISTRATION ACCEPT message include:

1) the allowed NSSAI containing S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default which are not subject to network slice-specific authentication and authorization;

2) the allowed NSSAI containing the subscribed S-NSSAIs marked as default, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, which are not subject to network slice-specific authentication and authorization; and

3) the rejected NSSAI containing the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN", except if the UE has not set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the S-NSSAI(s) is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are subject to NSSAA; or

b) if the Requested NSSAI IE includes one or more S-NSSAIs subject to network slice-specific authentication and authorization, the AMF shall in the REGISTRATION ACCEPT message include:

1) the allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s) which are not subject to network slice-specific authentication and authorization; and

2) the rejected NSSAI containing:

i) the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN", except if the UE has not set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the S-NSSAI is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are subject to NSSAA; and

ii) the S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN" or the rejection cause indicating "S-NSSAI not available in the current registration area", if any.

If the UE does not indicate support for network slice-specific authentication and authorization, the initial registration request is not for onboarding services in SNPN, and if:

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

b) none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

and one or more subscribed S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) marked as default which are not subject to network slice-specific authentication and authorization are available, the AMF shall:

a) put the allowed S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default and not subject to network slice-specific authentication and authorization in the allowed NSSAI of the REGISTRATION ACCEPT message;

b) put the subscribed S-NSSAIs marked as default and not subject to network slice-specific authentication and authorization, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, in the allowed NSSAI of the REGISTRATION ACCEPT message; and

c) determine a registration area such that all S-NSSAIs of the allowed NSSAI are available in the registration area.

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

If the REGISTRATION ACCEPT message contains the allowed NSSAI, then the UE shall store the included allowed NSSAI together with the PLMN identity of the registered PLMN and the registration area as specified in subclause 4.6.2.2. If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the UE shall store the received allowed NSSAI in each of allowed NSSAIs which are associated with each of the PLMNs.

If the REGISTRATION ACCEPT message contains a configured NSSAI IE with a new configured NSSAI for the current PLMN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN, the UE shall store the contents of the configured NSSAI IE as specified in subclause 4.6.2.2.

If the REGISTRATION ACCEPT message:

a) includes the 5GS registration result IE with the "NSSAA to be performed" indicator set to "Network slice-specific authentication and authorization is to be performed"the "NSSAA to be performed" indicator in the 5GS registration result IE;

b) includes a pending NSSAI; and

c) does not include an allowed NSSAI,

the UE shall delete the stored allowed NSSAI, if any, as specified in subclause 4.6.2.2, and the UE:

a) shall not initiate a 5GSM procedure except for emergency services ; and

b) shall not initiate a service request procedure except for cases f) and i) in subclause 5.6.1.1;

c) shall not initiate a NAS transport prodecure except for sending SMS, an LPP message, a location service message, an SOR transparent container, a UE policy container, a UE parameters update transparent container or a CIoT user data container until the UE receives an allowed NSSAI;

until the UE receives an allowed NSSAI.

If the UE included S1 mode supported indication in the REGISTRATION REQUEST message, the AMF supporting interworking with EPS shall set the IWK N26 bit to either:

a) "interworking without N26 interface not supported" if the AMF supports N26 interface; or

b) "interworking without N26 interface supported" if the AMF does not support N26 interface

in the 5GS network feature support IE in the REGISTRATION ACCEPT message.

The UE supporting S1 mode shall operate in the mode for interworking with EPS as follows:

a) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface not supported", the UE shall operate in single-registration mode;

b) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE supports dual-registration mode, the UE may operate in dual-registration mode; or

NOTE 10: The registration mode used by the UE is implementation dependent.

c) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE only supports single-registration mode, the UE shall operate in single-registration mode.

The UE shall treat the received interworking without N26 interface indicator for interworking with EPS as valid in the entire PLMN and its equivalent PLMN(s).

The network informs the UE about the support of specific features, such as IMS voice over PS session, location services (5G-LCS), emergency services, emergency services fallback and ATSSS, in the 5GS network feature support information element. In a UE with IMS voice over PS session capability, the IMS voice over PS session indicator, the Emergency services support indicator, and the Emergency services fallback indicator shall be provided to the upper layers. The upper layers take the IMS voice over PS session indicator into account when selecting the access domain for voice sessions or calls. In a UE with LCS capability, location services indicator (5G-LCS) shall be provided to the upper layers. When initiating an emergency call, the upper layers also take the IMS voice over PS session indicator, the Emergency services support indicator, and the Emergency services fallback indicator into account for the access domain selection. In a UE with the capability for ATSSS, the network support for ATSSS shall be provided to the upper layers.

The AMF shall set the EMF bit in the 5GS network feature support IE to:

a) "Emergency services fallback supported in NR connected to 5GCN and E-UTRA connected to 5GCN" if the network supports the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN or an E-UTRA cell connected to 5GCN;

b) "Emergency services fallback supported in NR connected to 5GCN only" if the network supports the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN and does not support the emergency services fallback procedure when the UE is in an E-UTRA cell connected to 5GCN;

c) "Emergency services fallback supported in E-UTRA connected to 5GCN only" if the network supports the emergency services fallback procedure when the UE is in an E-UTRA cell connected to 5GCN and does not support the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN; or

d) "Emergency services fallback not supported" if network does not support the emergency services fallback procedure when the UE is in any cell connected to 5GCN.

NOTE 11: If the emergency services are supported in neither the EPS nor the 5GS homogeneously, based on operator policy, the AMF will set the EMF bit in the 5GS network feature support IE to "Emergency services fallback not supported".

NOTE 12: Even though the AMF's support of emergency services fallback is indicated per RAT, the UE's support of emergency services fallback is not per RAT, i.e. the UE's support of emergency services fallback is the same for both NR connected to 5GCN and E-UTRA connected to 5GCN.

If the UE is not operating in SNPN access operation mode:

a) the network informs the UE that the use of access identity 1 is valid in the RPLMN or equivalent PLMN by setting the MPS indicator bit of the 5GS network feature support IE to "Access identity 1 valid", in the REGISTRATION ACCEPT message. Based on operator policy, the AMF sets the MPS indicator bit in the REGISTRATION ACCEPT message based on the MPS priority information in the user's subscription context obtained from the UDM;

b) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid", the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2, in all NG-RAN of the registered PLMN and its equivalent PLMNs. The MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid until the UE receives a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 not valid" or until the UE selects a non-equivalent PLMN. Access identity 1 is only applicable while the UE is in N1 mode.

c) the network informs the UE that the use of access identity 2 is valid in the RPLMN or equivalent PLMN by setting the MCS indicator bit of the 5GS network feature support IE to "Access identity 2 valid", in the REGISTRATION ACCEPT message. Based on operator policy, the AMF sets the MCS indicator bit in the REGISTRATION ACCEPT message based on the MCS priority information in the user's subscription context obtained from the UDM; and

d) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid", the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2, in all NG-RAN of the registered PLMN and its equivalent PLMNs. The MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid until the UE receives a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 not valid" or until the UE selects a non-equivalent PLMN. Access identity 2 is only applicable while the UE is in N1 mode.

If the UE is operating in SNPN access operation mode:

a) the network informs the UE that the use of access identity 1 is valid in the RSNPN by setting the MPS indicator bit of the 5GS network feature support IE to "Access identity 1 valid", in the REGISTRATION ACCEPT message. Based on operator policy, the AMF sets the MPS indicator bit in the REGISTRATION ACCEPT message based on the MPS priority information in the user's subscription context obtained from the UDM;

b) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid", the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2A, in all NG-RAN of the registered SNPN. The MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid until the UE receives a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 not valid" or until the UE selects another SNPN. Access identity 1 is only applicable while the UE is in N1 mode.

c) the network informs the UE that the use of access identity 2 is valid in the RSNPN by setting the MCS indicator bit of the 5GS network feature support IE to "Access identity 2 valid", in the REGISTRATION ACCEPT message. Based on operator policy, the AMF sets the MCS indicator bit in the REGISTRATION ACCEPT message based on the MCS priority information in the user's subscription context obtained from the UDM; and

d) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid", the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2A, in all NG-RAN of the registered SNPN. The MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid until the UE receives a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 not valid" or until the UE selects another SNPN. Access identity 2 is only applicable while the UE is in N1 mode.

If the UE indicates support for restriction on use of enhanced coverage in the REGISTRATION REQUEST message and:

a) in WB-N1 mode, the AMF decides to restrict the use of CE mode B for the UE, then the AMF shall set the RestrictEC bit to "CE mode B is restricted";

b) in WB-N1 mode, the AMF decides to restrict the use of both CE mode A and CE mode B for the UE, then the AMF shall set the RestrictEC bit to " Both CE mode A and CE mode B are restricted"; or

c) in NB-N1 mode, the AMF decides to restrict the use of enhanced coverage for the UE, then the AMF shall set the RestrictEC bit to "Use of enhanced coverage is restricted",

in the 5GS network feature support IE in the REGISTRATION ACCEPT message.

If the UE has set the Follow-on request indicator to "Follow-on request pending" in the REGISTRATION REQUEST message, or the network has downlink signalling pending, the AMF shall not immediately release the NAS signalling connection after the completion of the registration procedure.

If the UE is authorized to use V2X communication over PC5 reference point based on:

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE, or already stored in the 5GMM context in the AMF during the previous registration procedure as follows:

1) the V2XCEPC5 bit to "V2X communication over E-UTRA-PC5 supported"; or

2) the V2XCNPC5 bit to "V2X communication over NR-PC5 supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.287 [6C];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure.

If the UE is authorized to use ProSe services based on:

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE, or already stored in the 5GMM context in the AMF during the previous registration procedure as follows:

1) the ProSe direct discovery bit to "ProSe direct discovery supported"; or

2) the ProSe direct communication bit to "ProSe direct communication supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.304 [6E];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure.

If the Requested DRX parameters IE was included in the REGISTRATION REQUEST message, the AMF shall include the Negotiated DRX parameters IE in the REGISTRATION ACCEPT message. The AMF may set the Negotiated DRX parameters IE based on the received Requested DRX parameters IE and operator policy if available.

If the Requested NB-N1 mode DRX parameters IE was included in the REGISTRATION REQUEST message, the AMF shall include the Negotiated NB-N1 mode DRX parameters IE in the REGISTRATION ACCEPT message. The AMF may set the Negotiated NB-N1 mode DRX parameters IE based on the received Requested NB-N1 mode DRX parameters IE and operator policy if available.

The AMF shall include the Negotiated extended DRX parameters IE in the REGISTRATION ACCEPT message only if the Requested extended DRX parameters IE was included in the REGISTRATION REQUEST message, and the AMF supports and accepts the use of eDRX. The AMF may set the Negotiated extended DRX parameters IE based on the received Requested extended DRX parameters IE, operator policy, and the user's subscription context obtained from the UDM if available.

If:

a) the UE's USIM is configured with indication that the UE is to receive the SOR transparent container IE, the SOR transparent container IE included in the REGISTRATION ACCEPT message does not successfully pass the integrity check (see 3GPP TS 33.501 [24]); and

b) if the UE attempts obtaining service on another PLMNs as specified in 3GPP TS 23.122 [5] annex C;

then the UE shall locally release the established N1 NAS signalling connection after sending a REGISTRATION COMPLETE message.

If:

a) the UE's USIM is configured with indication that the UE is to receive the SOR transparent container IE, the SOR transparent container IE is not included in the REGISTRATION ACCEPT message; and

b) the UE attempts obtaining service on another PLMNs as specified in 3GPP TS 23.122 [5] annex C;

then the UE shall locally release the established N1 NAS signalling connection.

If the REGISTRATION ACCEPT message includes the SOR transparent container IE and the SOR transparent container IE successfully passes the integrity check (see 3GPP TS 33.501 [24]), the ME shall store the received SOR counter as specified in annex C and proceed as follows:

a) the UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; and

b) if the registration procedure is performed over 3GPP access and the UE attempts obtaining service on another PLMNs as specified in 3GPP TS 23.122 [5] annex C, then the UE may locally release the established N1 NAS signalling connection after sending a REGISTRATION COMPLETE message. Otherwise the UE shall send a REGISTRATION COMPLETE message and not release the current N1 NAS signalling connection locally. If an acknowledgement is requested in the SOR transparent container IE of the REGISTRATION ACCEPT message, the UE acknowledgement is included in the SOR transparent container IE of the REGISTRATION COMPLETE message. In the SOR transparent container IE carrying the acknowledgement, the UE shall set the ME support of SOR-CMCI indicator to "SOR-CMCI supported by the ME".

If the SOR transparent container IE successfully passes the integrity check (see 3GPP TS 33.501 [24]), indicates list of preferred PLMN/access technology combinations is provided and the list type indicates:

a) "PLMN ID and access technology list", then the ME shall replace the highest priority entries in the "Operator Controlled PLMN Selector with Access Technology" list stored in the ME and shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; or

b) "secured packet", then the ME shall behave as if a SMS is received with protocol identifier set to SIM data download, data coding scheme set to class 2 message and SMS payload as secured packet contents of SOR transparent container IE. The SMS payload is forwarded to UICC as specified in 3GPP TS 23.040 [4A] and the ME shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C.

If the SOR transparent container IE does not pass the integrity check successfully, then the UE shall discard the content of the SOR transparent container IE.

If required by operator policy, the AMF shall include the NSSAI inclusion mode IE in the REGISTRATION ACCEPT message (see table 4.6.2.3.1 of subclause 4.6.2.3). Upon receipt of the REGISTRATION ACCEPT message:

a) if the message includes the NSSAI inclusion mode IE, the UE shall operate in the NSSAI inclusion mode indicated in the NSSAI inclusion mode IE over the current access within the current PLMN and its equivalent PLMN(s), if any, in the current registration area; or

b) otherwise:

1) if the UE has NSSAI inclusion mode for the current PLMN and access type stored in the UE, the UE shall operate in the stored NSSAI inclusion mode;

2) if the UE does not have NSSAI inclusion mode for the current PLMN and the access type stored in the UE and if the UE is performing the registration procedure over:

i) 3GPP access, the UE shall operate in NSSAI inclusion mode D in the current PLMN and the current access type;

ii) untrusted non-3GPP access, the UE shall operate in NSSAI inclusion mode B in the current PLMN and the current access type; or

iii) trusted non-3GPP access, the UE shall operate in NSSAI inclusion mode D in the current PLMN and the current access type; or

3) if the 5G-RG does not have NSSAI inclusion mode for the current PLMN and wireline access stored in the 5G-RG, and the 5G-RG is performing the registration procedure over wireline access, the 5G-RG shall operate in NSSAI inclusion mode B in the current PLMN and the current access type.

The AMF may include operator-defined access category definitions in the REGISTRATION ACCEPT message.

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

If the UE has indicated support for service gap control in the REGISTRATION REQUEST message and:

- the REGISTRATION ACCEPT message contains the T3447 value IE, then the UE shall store the new T3447 value, erase any previous stored T3447 value if exists and use the new T3447 value with the timer T3447 next time it is started; or

- the REGISTRATION ACCEPT message does not contain the T3447 value IE, then the UE shall erase any previous stored T3447 value if exists and stop the timer T3447 if running.

If the T3448 value IE is present in the received REGISTRATION ACCEPT message and the value indicates that this timer is neither zero nor deactivated, the UE shall:

a) stop timer T3448 if it is running; and

b) start timer T3448 with the value provided in the T3448 value IE.

If the UE is using 5GS services with control plane CIoT 5GS optimization, the T3448 value IE is present in the REGISTRATION ACCEPT message and the value indicates that this timer is either zero or deactivated, the UE shall ignore the T3448 value IE and proceed as if the T3448 value IE was not present.

If the REGISTRATION ACCEPT message contains the Truncated 5G-S-TMSI configuration IE, then the UE shall store the included truncated 5G-S-TMSI configuration and return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the truncated 5G-S-TMSI configuration.

NOTE 13: The UE provides the truncated 5G-S-TMSI configuration to the lower layers.

If the UE is not in NB-N1 mode, the UE has set the RACS bit to "RACS supported" in the 5GMM Capability IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message includes:

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested", the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription stored at the UE, then the UE shall, after the completion of the ongoing registration procedure, initiate a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3.2 over the existing N1 NAS signalling connection; or

b) a UE radio capability ID IE, the UE shall store the UE radio capability ID as specified in annex C.

If the UE has included the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message contains the Service-level-AA pending indication IE, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the Service-level-AA pending indication IE, and the UE shall not attempt to perform another registration procedure for UAS services until the UUAA-MM procedure is completed, or to establish a PDU session for USS communication or a PDU session for C2 communication until the UUAA-MM procedure is completed successfully.

If the UE has included the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message does not contain the Service-level-AA pending indication IE, the UE shall consider the UUAA-MM procedure is not triggered.

Editor's note: It is FFS whether the Service-level-AA pending indication is included in the service-level AA container IE.

##### 5.5.1.2.5 Initial registration not accepted by the network

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

In NB-N1 mode, if the registration request is rejected due to operator determined barring (see 3GPP TS 29.503 [20AB]), the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

If the REGISTRATION REJECT message with 5GMM cause #76 or #78 was received without integrity protection, then the UE shall discard the message. If the REGISTRATION REJECT message with 5GMM cause #62 was received without integrity protected, the behaviour of the UE is specified in subclause 5.3.20.2.

Based on operator policy, if the initial registration request is rejected due to core network redirection for CIoT optimizations, the network shall set the 5GMM cause value to #31 "Redirection to EPC required".

NOTE 1: The network can take into account the UE's S1 mode capability, the EPS CIoT network behaviour supported by the UE or the EPS CIoT network behaviour supported by the EPC to determine the rejection with the 5GMM cause value #31 "Redirection to EPC required".

If the initial registration request is rejected because:

a) all the S-NSSAI(s) included in the requested NSSAI are either rejected for the current PLMN, rejected for the current registration area, rejected for the failed or revoked NSSAA, or rejected for the maximum number of UEs reached; and

b) the UE set the NSSAA bit in the 5GMM capability IE to:

1) "Network slice-specific authentication and authorization supported" and:

i) there are no subscribed S-NSSAIs marked as default;

ii) all subscribed S-NSSAIs marked as default are not allowed; or

iii) network slice-specific authentication and authorization has failed or been revoked for all subscribed S-NSSAIs marked as default and based on network local policy, the network decides not to initiate the network slice-specific re-authentication and re-authorization procedures for any subscribed S-NSSAI marked as default requested by the UE; or

2) "Network slice-specific authentication and authorization not supported"; and

i) there are no subscribed S-NSSAIs which are marked as default; or

ii) all subscribed S-NSSAIs marked as default are either not allowed or are subject to network slice-specific authentication and authorization;

the network shall set the 5GMM cause value to #62 "No network slices available" and shall include the rejected S-NSSAI(s) in the rejected NSSAI of the REGISTRATION REJECT message. Otherwise, the network may include the rejected S-NSSAI(s) in the rejected NSSAI of the REGISTRATION REJECT message.

If the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message, the rejected S-NSSAI(s) shall be included in the Extended rejected NSSAI IE of the REGISTRATION REJECT message. Otherwise the rejected S-NSSAI(s) shall be included in the Rejected NSSAI IE of the REGISTRATION REJECT message.

If the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for all S-NSSAIs in the requested NSSAI as specified in subclause 4.6.2.5, the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the Extended rejected NSSAI IE in the REGISTRATION REJECT message. In addition, the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the Extended rejected NSSAI IE of the REGISTRATION REJECT message.

If the AMF receives the initial registration request along with the authenticated indication over N2 reference point on non-3GPP access and does not receive the indication that authentication by the home network is not required over N12 reference point, the network shall set the 5GMM cause value to #72 "Non-3GPP access to 5GCN not allowed".

If the initial registration request from a UE supporting CAG is rejected due to CAG restrictions, the network shall set the 5GMM cause value to #76 "Not authorized for this CAG or authorized for CAG cells only" and should include the "CAG information list" in the CAG information list IE in the REGISTRATION REJECT message.

NOTE 2: The network cannot be certain that "CAG information list" stored in the UE is updated as result of sending of the REGISTRATION REJECT message with the CAG information list IE, as the REGISTRATION REJECT message is not necessarily delivered to the UE (e.g. due to abnormal radio conditions).

NOTE 3: The "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription.

If the initial registration request from a UE not supporting CAG is rejected due to CAG restrictions, the network shall operate as described in bullet j) of subclause 5.5.1.2.8.

If the UE's initial registration request is via a satellite NG-RAN cell and the network using the User Location Information provided by the NG-RAN, see 3GPP TS 38.413 [31], is able to determine that the UE is in a location where the network is not allowed to operate, the network shall set the 5GMM cause value in the REGISTRATION REJECT message to #78 "PLMN not allowed to operate at the present UE location" and may include an information element in the REGISTRATION REJECT message to indicate the country of the UE location.

Editor's note: [5GSAT\_ARCH-CT, CR#3217]. The name and the encoding of the information element providing the country of the UE location is FFS

If the AMF receives the initial registration request including the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE and the AMF determines that the UE is not allowed to use UAS services via 5GS based on the user's subscription data and the operator policy, the AMF shall return a REGISTRATION REJECT message with 5GMM cause #79 (UAS services not allowed).

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

#3 (Illegal UE); or

#6 (Illegal ME).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

 In case of PLMN, the UE shall consider the USIM as invalid for 5GS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.1;

 In case of SNPN, if the UE does not support access to an SNPN using credentials from a credentials holder, the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. In case of SNPN, if the UE supports access to an SNPN using credentials from a credentials holder, the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. Additionally, if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN, the UE shall consider the USIM as invalid for the current SNPN until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.2.

 The UE shall delete the list of equivalent PLMNs (if any) and enter the state 5GMM-DEREGISTERED.NO-SUPI. If the message has been successfully integrity checked by the NAS, then the UE shall:

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN if the UE maintains these counters;

 to a UE implementation-specific maximum value.

3) delete the 5GMM parameters stored in non-volatile memory of the ME as specified in annex C.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value. The USIM shall be considered as invalid also for non-EPS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a in 3GPP TS 24.301 [15]. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to a UE implementation-specific maximum value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#7 (5GS services not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

 In case of PLMN, the UE shall consider the USIM as invalid for 5GS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.1;

 In case of SNPN, if the UE does not support access to an SNPN using credentials from a credentials holder, the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 5GS services until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. In case of SNPN, if the UE supports access to an SNPN using credentials from a credentials holder, the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. Additionally, if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN, the UE shall consider the USIM as invalid for the current SNPN until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.2.

 The UE shall enter the state 5GMM-DEREGISTERED.NO-SUPI. If the message has been successfully integrity checked by the NAS, then the UE shall:

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN if the UE maintains these counters;

 to a UE implementation-specific maximum value.

3) delete the 5GMM parameters stored in non-volatile memory of the ME as specified in annex C.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#11 (PLMN not allowed).

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall delete the list of equivalent PLMNs and reset the registration attempt counter and store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in clause 5.3.19a.1. For 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5], and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18]. If the message has been successfully integrity checked by the NAS and the UE mantains the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN, the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same PLMN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#12 (Tracking area not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter.

 If:

1) the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. If the REGISTRATION REJECT is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, for non-integrity protected NAS reject message.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value.

#13 (Roaming not allowed in this tracking area).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall delete the list of equivalent PLMNs (if available) and reset the registration attempt counter.

 If:

1) the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE or optionally 5GMM-DEREGISTERED.PLMN-SEARCH. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE or optionally 5GMM-DEREGISTERED.PLMN-SEARCH. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, for non-integrity protected NAS reject message.

 For 3GPP access, if the UE is registered in S1 mode and operating in dual-registration mode, the PLMN that the UE chooses to register in is specified in subclause 4.8.3. Otherwise the UE shall perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5].

 For non-3GPP access, the UE shall perform network selection as defined in 3GPP TS 24.502 [18].

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value.

#15 (No suitable cells in tracking area).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter.

 If:

1) the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, for non-integrity protected NAS reject message.

 The UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C].

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value.

 If received over non-3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.2.7.

#22 (Congestion).

 If the T3346 value IE is present in the REGISTRATION REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below; otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.2.7.

 The UE shall abort the initial registration procedure, set the 5GS update status to 5U2 NOT UPDATED, reset the registration attempt counter and enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION.

 The UE shall stop timer T3346 if it is running.

 If the REGISTRATION REJECT message is integrity protected, the UE shall start timer T3346 with the value provided in the T3346 value IE.

 If the REGISTRATION REJECT message is not integrity protected, the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [12].

 The UE stays in the current serving cell and applies the normal cell reselection process. The initial registration procedure is started if still needed when timer T3346 expires or is stopped.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value.

#27 (N1 mode not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter and shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. If the message has been successfully integrity checked by the NAS, the UE shall set:

1) the PLMN-specific N1 mode attempt counter for 3GPP access and the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for 3GPP access for the current SNPN in case of SNPN and the SNPN-specific attempt counter for non-3GPP access for the current SNPN;

 to the UE implementation-specific maximum value.

 The UE shall disable the N1 mode capability for the specific access type for which the message was received (see subclause 4.9).

 If the message has been successfully integrity checked by the NAS, the UE shall disable the N1 mode capability also for the other access type (see subclause 4.9).

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the attach attempt counter and enter the state EMM-DEREGISTERED.

#31 (Redirection to EPC required).

 5GMM cause #31 received by a UE that has not indicated support for CIoT optimizations or not indicated support for S1 mode or received by a UE over non-3GPP access is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter.

 The UE shall enable the E-UTRA capability if it was disabled, disable the N1 mode capability for 3GPP access (see subclause 4.9.2) and enter the 5GMM-DEREGISTERED.NO-CELL-AVAILABLE.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach procedure is rejected with the EMM cause with the same value.

#62 (No network slices available).

 The UE shall abort the initial registration procedure, set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.NORMAL-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH. Additionally, the UE shall reset the registration attempt counter.

 The UE receiving the rejected NSSAI in the REGISTRATION REJECT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

 "S-NSSAI not available in the current PLMN or SNPN"

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN until switching off the UE, the UICC containing the USIM is removed, an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

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

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as described in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

 "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

 "S-NSSAI not available due to maximum number of UEs reached"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

Editor's note [WI: eNS-Ph2, CR#3417]: Whether "S-NSSAI not available due to maximum number of UEs reached" is applicable in an SNPN is FFS.

 If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then the UE shall for each S-NSSAI behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running; and

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

 If the UE has an allowed NSSAI or configured NSSAI that contains S-NSSAI(s) which are not included in the rejected NSSAI the UE may stay in the current serving cell, apply the normal cell reselection process and start an initial registration with a requested NSSAI that includes any S-NSSAI from the allowed NSSAI or the configured NSSAI that is not in the rejected NSSAI. Otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally, the UE may disable the N1 mode capability for the current PLMN or SNPN if the UE does not have an allowed NSSAI and each S-NSSAI in configured NSSAI, if available, was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9.

 If the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN and has a default configured NSSAI containing one or more S-NSSAIs that are not included in the rejected NSSAI,

1) the UE may stay in the current serving cell, apply the normal cell reselection process, and start an initial registration with a requested NSSAI with that default configured NSSAI; or

2) if all the S-NSSAI(s) in the default configured NSSAI are rejected and at least one S-NSSAI is rejected due to "S-NSSAI not available in the current registration area",

i) if the REGISTRATION REJECT message is integrity protected and the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; or

ii) if the REGISTRATION REJECT message is integrity protected and the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE.

 Otherwise, the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally, the UE may disable the N1 mode capability for the current PLMN or SNPN if each S-NSSAI in the default configured NSSAI was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9.

 If the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN and has rejected NSSAI for the reached maximum number of UEs, and the UE wants to obtain services in the current serving cell without performing a PLMN selection or SNPN selection, the UE may stay in the current serving cell and attempt to use the rejected S-NSSAI(s) for the maximum number of UEs reached in the current serving cell after the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU2 NOT UPDATED, reset the attach attempt counter and enter the state EMM-DEREGISTERED.

#72 (Non-3GPP access to 5GCN not allowed).

 When received over non-3GPP access the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter and enter the state 5GMM-DEREGISTERED. If the message has been successfully integrity checked by the NAS, the UE shall set:

1) the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN: or

2) the SNPN-specific attempt counter for non-3GPP access for that SNPN in case of SNPN;

 to the UE implementation-specific maximum value.

NOTE 4: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

 The UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3).

 As an implementation option, the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

 If received over 3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.2.7.

#73 (Serving network not authorized).

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall delete the list of equivalent PLMNs, reset the registration attempt counter, store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A. For 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5], and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18]. If the message has been successfully integrity checked by the NAS, the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the attach attempt counter and enter the state EMM-DEREGISTERED.

#74 (Temporarily not authorized for this SNPN).

 5GMM cause #74 is only applicable when received from a cell belonging to an SNPN. 5GMM cause #74 received from a cell not belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and store the SNPN identity in the "temporarily forbidden SNPNs" list for the specific access type for which the message was received and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the registration request is not for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]. If the registration request is for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

NOTE 5: When 5GMM cause #74 is received over 3GPP access, the term "other access" in "the UE also supports the registration procedure over the other access to the same SNPN" is used to express access to SNPN services via a PLMN.

#75 (Permanently not authorized for this SNPN).

 5GMM cause #75 is only applicable when received from a cell belonging to an SNPN with a globally-unique SNPN identity. 5GMM cause #75 received from a cell not belonging to an SNPN or a cell belonging to an SNPN with a non-globally-unique SNPN identity is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and store the SNPN identity in the "permanently forbidden SNPNs" list for the specific access type for which the message was received and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the registration request is not for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]. If the registration request is for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

NOTE 6: When 5GMM cause #75 is received over 3GPP access, the term "other access" in "the UE also supports the registration procedure over the other access to the same SNPN" is used to express access to SNPN services via a PLMN.

#76 (Not authorized for this CAG or authorized for CAG cells only).

 This cause value received via non-3GPP access or from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED, store the 5GS update status according to clause 5.1.3.2.2, and reset the registration attempt counter.

 If 5GMM cause #76 is received from:

1) a CAG cell, and if the UE receives a "CAG information list" in the CAG information list IE included in the REGISTRATION REJECT message, the UE shall:

i) replace the "CAG information list" stored in the UE with the received CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 7: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

 Otherwise, then the UE shall delete the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN. In the case the "allowed CAG list" for the current PLMN only contains a range of CAG-IDs, how the UE deletes the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN is up to UE implementation. In addition:

i) if the entry in the "CAG information list" for the current PLMN does not include an "indication that the UE is only allowed to access 5GS via CAG cells" or if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and the updated "allowed CAG list" for the current PLMN includes one or more CAG-IDs, then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list";

ii) if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and the updated "allowed CAG list" for the current PLMN does not include any CAG-ID, then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

iii) if the "CAG information list" does not include an entry for the current PLMN, then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list".

2) a non-CAG cell, and if the UE receives a "CAG information list" in the CAG information list IE included in the REGISTRATION REJECT message, the UE shall:

i) replace the "CAG information list" stored in the UE with the received CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 8: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

 Otherwise, the UE shall store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN, if any. If the "CAG information list" stored in the UE does not include the current PLMN's entry, the UE shall add an entry for the current PLMN to the "CAG information list" and store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN. If the UE does not have a stored "CAG information list", the UE shall create a new "CAG information list" and add an entry with an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN.

In addition:

i) if the "allowed CAG list" for the current PLMN includes one or more CAG-IDs, then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated CAG information; or

ii) if the "allowed CAG list" for the current PLMN does not include any CAG-ID, then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list".

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED, reset the attach attempt counter and enter the state EMM-DEREGISTERED.

#77 (Wireline access area not allowed).

 5GMM cause #77 is only applicable when received from a wireline access network by the 5G-RG or the W-AGF acting on behalf of the FN-CRG. 5GMM cause #77 received from a 5G access network other than a wireline access network and 5GMM cause #77 received by the W-AGF acting on behalf of the FN-BRG are considered as abnormal cases and the behaviour of the UE is specified in subclause 5.5.1.2.7.

 When received over wireline access network, the 5G-RG and the W-AGF acting on behalf of the FN-CRG shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2), shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI, shall reset the registration attempt counter, shall enter the state 5GMM-DEREGISTERED and shall act as specified in subclause 5.3.23.

NOTE 9: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

#78 (PLMN not allowed to operate at the present UE location).

 This cause value received from a non-satellite NG-RAN cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall delete the list of equivalent PLMNs (if available) and reset the registration attempt counter. The UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5].

Editor's note: [5GSAT\_ARCH-CT, CR#3217]. It is FFS how to prevent the UE from making repeated attempts at selecting the same satellite access PLMN if there are no other available PLMNs at UE's location.

#79 (UAS services not allowed).

 The UE shall abort the initial registration procedure, set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.NORMAL-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH. Additionally, the UE shall reset the registration attempt counter. The UE shall not attempt the registration procedure with including the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE to the current PLMN until the UE is switched off or the UICC containing the USIM is removed.

Other values are considered as abnormal cases. The behaviour of the UE in those cases is specified in subclause 5.5.1.2.7.

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

##### 5.5.1.3.4 Mobility and periodic registration update accepted by the network

If the registration update request has been accepted by the network, the AMF shall send a REGISTRATION ACCEPT message to the UE.

If timer T3513 is running in the AMF, the AMF shall stop timer T3513 if a paging request was sent with the access type indicating non-3GPP and the REGISTRATION REQUEST message includes the Allowed PDU session status IE.

If timer T3565 is running in the AMF, the AMF shall stop timer T3565 when a REGISTRATION REQUEST message is received.

For each of the information elements: 5GMM capability, S1 UE network capability, and UE security capability, the AMF shall store all octets received from the UE in the REGISTRATION REQUEST message, up to the maximum length defined for the respective information element.

NOTE 1: This information is forwarded to the new AMF during inter-AMF handover or to the new MME during inter-system handover to S1 mode.

The 5G-GUTI reallocation shall be part of the registration procedure for mobility registration update. The 5G-GUTI reallocation should be part of the registration procedure for periodic registration update. During the registration procedure for mobility registration update, if the AMF has not allocated a new 5G-GUTI by the generic UE configuration update procedure, the AMF shall include in the REGISTRATION ACCEPT message the new assigned 5G-GUTI.

If the UE has set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the AMF needs to update the "CAG information list" stored in the UE, the AMF shall include the CAG information list IE in the REGISTRATION ACCEPT message.

NOTE 2: The "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription.

If a 5G-GUTI or the SOR transparent container IE is included in the REGISTRATION ACCEPT message, the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

If the Operator-defined access category definitions IE or the Extended emergency number list IE or the CAG information list IE are included in the REGISTRATION ACCEPT message, the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

If the UE is not in NB-N1 mode and the UE has set the RACS bit to "RACS supported" in the 5GMM Capability IE of the REGISTRATION REQUEST message, the AMF may include either a UE radio capability ID IE or a UE radio capability ID deletion indication IE in the REGISTRATION ACCEPT message. If the UE radio capability ID IE or the UE radio capability ID deletion indication IE is included in the REGISTRATION ACCEPT message, the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The AMF may include a new TAI list for the UE in the REGISTRATION ACCEPT message. The new TAI list shall not contain both tracking areas in NB-N1 mode and tracking areas not in NB-N1 mode. The UE, upon receiving a REGISTRATION ACCEPT message, shall delete its old TAI list and store the received TAI list. If there is no TAI list received, the UE shall consider the old TAI list as valid.

NOTE 3: When assigning the TAI list, the AMF can take into account the eNodeB's capability of support of CIoT 5GS optimization.

The AMF may also include a list of equivalent PLMNs in the REGISTRATION ACCEPT message. Each entry in the list contains a PLMN code (MCC+MNC). The UE shall store the list as provided by the network, and if there is no emergency PDU session established, the UE shall remove from the list any PLMN code that is already in the forbidden PLMN list as specified in subclause 5.3.13A. If the UE is not registered for emergency services and there is an emergency PDU session established, the UE shall remove from the list of equivalent PLMNs any PLMN code present in the forbidden PLMN list as specified in subclause 5.3.13A, when the emergency PDU session is released. In addition, the UE shall add to the stored list the PLMN code of the registered PLMN that sent the list. The UE shall replace the stored list on each receipt of the REGISTRATION ACCEPT message. If the REGISTRATION ACCEPT message does not contain a list, then the UE shall delete the stored list.

If the UE is not registered for emergency services, and if the PLMN identity of the registered PLMN is a member of the forbidden PLMN list as specified in subclause 5.3.13A, any such PLMN identity shall be deleted from the corresponding list(s).

The AMF may include new service area restrictions in the Service area list IE in the REGISTRATION ACCEPT message. The UE, upon receiving a REGISTRATION ACCEPT message with new service area restrictions shall act as described in subclause 5.3.5.

If the Service area list IE is not included in the REGISTRATION ACCEPT message, any tracking area in the registered PLMN and its equivalent PLMN(s) in the registration area is considered as an allowed tracking area as described in subclause 5.3.5.

The AMF shall include the MICO indication IE in the REGISTRATION ACCEPT message only if the MICO indication IE was included in the REGISTRATION REQUEST message, the AMF supports and accepts the use of MICO mode. If the AMF supports and accepts the use of MICO mode, the AMF may indicate "all PLMN registration area allocated" in the MICO indication IE in the REGISTRATION ACCEPT message. If "all PLMN registration area allocated" is indicated in the MICO indication IE, the AMF shall not assign and include the TAI list in the REGISTRATION ACCEPT message. If the REGISTRATION ACCEPT message includes an MICO indication IE indicating "all PLMN registration area allocated", the UE shall treat all TAIs in the current PLMN as a registration area and delete its old TAI list. If "strictly periodic registration timer supported" is indicated in the MICO indication IE in the REGISTRATION REQUEST message, the AMF may indicate "strictly periodic registration timer supported" in the MICO indication IE and may include the T3512 value IE in the REGISTRATION ACCEPT message. If the timer value received in T3512 IE is different from the already stored value of the timer T3512 and the timer T3512 is running, the UE shall restart T3512 with the new value received in the T3512 value IE.

The AMF shall include an active time value in the T3324 IE in the REGISTRATION ACCEPT message if the UE requested an active time value in the REGISTRATION REQUEST message and the AMF accepts the use of MICO mode and the use of active time.

If the UE does not include MICO indication IE in the REGISTRATION REQUEST message, then the AMF shall disable MICO mode if it was already enabled.

The AMF may include the T3512 value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent over the 3GPP access.

The AMF may include the non-3GPP de-registration timer value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent for the non-3GPP access.

If the UE supporting MUSIM does not include the Paging restriction IE in the REGISTRATION REQUEST message, the AMF shall delete any stored paging restriction preferences for the UE and stop restricting paging.

If the UE supporting MUSIM requests the release of the NAS signalling connection, by setting Request type to "NAS signalling connection release" in the UE request type IE included in the REGISTRATION REQUEST message, the AMF shall initiate the release of the NAS signalling connection after the completion of the registration procedure for mobility and periodic registration update. If the UE requests restriction of paging by including the Paging restriction IE, the AMF shall store the paging restriction preferences of the UE and enforce these restrictions in the paging procedure as described in clause 5.6.2.

If the UE requests "control plane CIoT 5GS optimization" in the 5GS update type IE, indicates support of control plane CIoT 5GS optimization in the 5GMM capability IE and the AMF decides to accept the requested CIoT 5GS optimization and the registration request, the AMF shall indicate "control plane CIoT 5GS optimization supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message.

If the UE has indicated support for the control plane CIoT 5GS optimizations, and the AMF decides to activate the congestion control for transport of user data via the control plane, then the AMF shall include the T3448 value IE in the REGISTRATION ACCEPT message.

If the AMF decides to deactivate the congestion control for transport of user data via the control plane, then the AMF shall delete the stored control plane data back-off time for the UE and the AMF shall not include timer T3448 value IE in the REGISTRATION ACCEPT message.

If:

- the UE in NB-N1 mode is using control plane CIoT 5GS optimization; and

- the network is configured to provide the truncated 5G-S-TMSI configuration for control plane CIoT 5GS optimizations;

the AMF shall include the Truncated 5G-S-TMSI configuration IE in the REGISTRATION ACCEPT message and set the "Truncated AMF Set ID value" and the "Truncated AMF Pointer value" in the Truncated 5G-S-TMSI configuration IE based on network policies. The AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

For inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode, if the UE has included a ngKSI indicating a current 5G NAS security context in the REGISTRATION REQUEST message by which the REGISTRATION REQUEST message is integrity protected, the AMF shall take one of the following actions:

a) if the AMF retrieves the current 5G NAS security context as indicated by the ngKSI and 5G-GUTI sent by the UE, the AMF shall integrity check the REGISTRATION REQUEST message using the current 5G NAS security context and integrity protect the REGISTRATION ACCEPT message using the current 5G NAS security context;

b) if the AMF cannot retrieve the current 5G NAS security context as indicated by the ngKSI and 5G-GUTI sent by the UE, the AMF shall treat the REGISTRATION REQUEST message fails the integrity check and take actions as specified in subclause 4.4.4.3; or

c) if the UE has not included an Additional GUTI IE, the AMF may treat the REGISTRATION REQUEST message as in the previous item, i.e. as if it cannot retrieve the current 5G NAS security context.

NOTE 4: The handling described above at failure to retrieve the current 5G NAS security context or if no Additional GUTI IE was provided does not preclude the option for the AMF to perform a primary authentication and key agreement procedure and create a new native 5G NAS security context.

For inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode, the AMF shall integrity check REGISTRATION REQUEST message using the current K'AMF as derived when triggering the handover to N1 mode (see subclause 4.4.2.2). The AMF shall verify the received UE security capabilities in the REGISTRATION REQUEST message. The AMF shall then take one of the following actions:

a) if the REGISTRATION REQUEST does not contain a valid KSIAMF in the Non-current native NAS key set identifier IE, the AMF shall remove the non-current native 5G NAS security context, if any, for any 5G-GUTI for this UE. The AMF shall then integrity protect and cipher the REGISTRATION ACCEPT message using the security context based on K'AMF and take the mapped 5G NAS security context into use; or

b) if the REGISTRATION REQUEST contains a valid KSIAMF in the Non-current native NAS key set identifier IE and:

1) the AMF decides to take the native 5G NAS security context into use, the AMF shall initiate a security mode control procedure to take the corresponding native 5G NAS security context into use and then integrity protect and cipher the REGISTRATION ACCEPT message using the corresponding native 5G NAS security context; and

2) otherwise, the AMF shall then integrity protect and cipher the REGISTRATION ACCEPT message using the security context based on K'AMF and take the mapped 5G NAS security context into use.

NOTE 5: In above bullet b), it is recommended for the AMF to initiate a security mode control procedure to take the corresponding native 5G NAS security context into use.

If the UE has included the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message, and if:

- the UE has a valid aerial UE subscription information; and

- the UUAA procedure is to be performed during the registration procedure according to operator policy; and

- there is no valid UUAA result for the UE in the UE 5GMM context,

then the AMF shall initiate the UUAA-MM procedure with the UAS-NF as specified in TS 23.256 [6AB] and shall include a Service-level-AA pending indication IE in the REGISTRATION ACCEPT message. The AMF shall store in the UE 5GMM context that a UUAA procedure is pending. The AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

Editor's note: It is FFS when there is valid UUAA result for the UE in the UE 5GMM context

Editor's note: How to handle pending NSSAI during the registration procedure for UAS service is FFS.

Editor's note: It is FFS whether the Service-level-AA pending indication is included in the service-level AA container IE.

If the AMF determines that the UUAA-MM procedure needs to be performed for a UE, the AMF has not received the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message from the UE and the AMF decides to accept the UE to be registered for other services than UAS services based on the user's subscription data and the operator policy, the AMF shall accept the registration update request and shall mark in the UE's 5GMM context that the UE is not allowed to request UAS services.

Upon receipt of the REGISTRATION ACCEPT message, the UE shall reset the registration attempt counter and service request attempt counter, enter state 5GMM-REGISTERED and set the 5GS update status to 5U1 UPDATED.

If the UE receives the REGISTRATION ACCEPT message from a PLMN, then the UE shall reset the PLMN-specific attempt counter for that PLMN for the specific access type for which the message was received. The UE shall also reset the PLMN-specific N1 mode attempt counter for that PLMN for the specific access type for which the message was received. If the message was received via 3GPP access, the UE shall reset the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "SIM/USIM considered invalid for non-GPRS services", if any. If the message was received via non-3GPP access, the UE shall reset the counter for "USIM considered invalid for 5GS services over non-3GPP" events.

If the UE receives the REGISTRATION ACCEPT message from an SNPN, then the UE shall reset the SNPN-specific attempt counter for the current SNPN for the specific access type for which the message was received. If the message was received via 3GPP access, the UE shall reset the counter for "the entry for the current SNPN considered invalid for 3GPP access" events. If the message was received via non-3GPP access, the UE shall reset the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events.

If the REGISTRATION ACCEPT message included a T3512 value IE, the UE shall use the value in T3512 value IE as periodic registration update timer (T3512). If the T3512 value IE is not included, the UE shall use the value currently stored, e.g. from a prior REGISTRATION ACCEPT message.

If the REGISTRATION ACCEPT message include a T3324 value IE, the UE shall use the value in the T3324 value IE as active time timer (T3324). If the REGISTRATION ACCEPT message does not include a T3324 value IE, UE shall not start the timer T3324 until a new value is received from the network.

If the REGISTRATION ACCEPT message included a non-3GPP de-registration timer value IE, the UE shall use the value in non-3GPP de-registration timer value IE as non-3GPP de-registration timer. If non-3GPP de-registration timer value IE is not included, the UE shall use the value currently stored, e.g. from a prior REGISTRATION ACCEPT message. If non-3GPP de-registration timer value IE is not included and there is no stored non-3GPP de-registration timer value in the UE, the UE shall use the default value of the non-3GPP de-registration timer.

If the REGISTRATION ACCEPT message contains a 5G-GUTI, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the received 5G-GUTI, stop timer T3519 if running, and delete any stored SUCI. The UE shall provide the 5G-GUTI to the lower layer of 3GPP access if the REGISTRATION ACCEPT message is sent over the non-3GPP access, and the UE is in 5GMM-REGISTERED in both 3GPP access and non-3GPP access in the same PLMN.

If the REGISTRATION ACCEPT message contains the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed", or contains a configured NSSAI IE with a new configured NSSAI for the current PLMN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the successful update of the network slicing information.

If the REGISTRATION ACCEPT message contains the CAG information list IE and the UE had set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message, the UE shall:

a) replace the "CAG information list" stored in the UE with the received CAG information list IE when received in the HPLMN or EHPLMN;

b) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 6: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

c) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

The UE shall store the "CAG information list" received in the CAG information list IE as specified in annex C.

If the received "CAG information list" includes an entry containing the identity of the registered PLMN, the UE shall operate as follows.

a) if the UE receives the REGISTRATION ACCEPT message via a CAG cell, the entry for the registered PLMN in the received "CAG information list" does not include any of the CAG-ID(s) supported by the current CAG cell, and:

1) the entry for the registered PLMN in the received "CAG information list" does not include an "indication that the UE is only allowed to access 5GS via CAG cells", then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"; or

2) the entry for the registered PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and:

i) if the entry for the registered PLMN in the received "CAG information list" includes one or more CAG-IDs, the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

ii) if the entry for the registered PLMN in the received "CAG information list" does not include any CAG-ID and:

A) the UE does not have an emergency PDU session, then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

B) the UE has an emergency PDU session, then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE; or

b) if the UE receives the REGISTRATION ACCEPT message via a non-CAG cell and the entry for the registered PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and:

1) if the "allowed CAG list" for the registered PLMN in the received "CAG information list" includes one or more CAG-IDs, the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

2) if the entry for the registered PLMN in the received "CAG information list" does not include any CAG-ID and:

i) the UE does not have an emergency PDU session, then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

ii) the UE has an emergency PDU session, then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE.

If the received "CAG information list" does not include an entry containing the identity of the registered PLMN and the UE receives the REGISTRATION ACCEPT message via a CAG cell, the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list".

If the REGISTRATION ACCEPT message contains the Operator-defined access category definitions IE or the Extended emergency number list IE or the CAG information list IE, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the operator-defined access category definitions or the extended local emergency numbers list or the CAG information list IE.

If the REGISTRATION ACCEPT message contains the UE radio capability ID IE or the UE radio capability ID deletion indication IE, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the UE radio capability ID IE or the UE radio capability ID deletion indication IE.

If the T3448 value IE is present in the received REGISTRATION ACCEPT message and the value indicates that this timer is neither zero nor deactivated, the UE shall:

a) stop timer T3448 if it is running; and

b) start timer T3448 with the value provided in the T3448 value IE.

If the UE is using 5GS services with control plane CIoT 5GS optimization, the T3448 value IE is present in the REGISTRATION ACCEPT message and the value indicates that this timer is either zero or deactivated, the UE shall ignore the T3448 value IE and proceed as if the T3448 value IE was not present.

If the UE in 5GMM-IDLE mode initiated the registration procedure for mobility and periodic registration update and the REGISTRATION ACCEPT message does not include the T3448 value IE and if timer T3448 is running, then the UE shall stop timer T3448.

Upon receiving a REGISTRATION COMPLETE message, the AMF shall stop timer T3550 and change to state 5GMM-REGISTERED. The 5G-GUTI, if sent in the REGISTRATION ACCEPT message, shall be considered as valid, and the UE radio capability ID, if sent in the REGISTRATION ACCEPT message, shall be considered as valid.

If the 5GS update type IE was included in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS supported" and:

a) the SMSF address is stored in the UE 5GMM context and:

1) the UE is considered available for SMS over NAS; or

2) the UE is considered not available for SMS over NAS and the SMSF has confirmed that the activation of the SMS service is successful; or

b) the SMSF address is not stored in the UE 5GMM context, the SMSF selection is successful and the SMSF has confirmed that the activation of the SMS service is successful;

then the AMF shall set the SMS allowed bit of the 5GS registration result IE in the REGISTRATION ACCEPT message as specified in subclause 5.5.1.2.4. If the UE 5GMM context does not contain an SMSF address or the UE is not considered available for SMS over NAS, then the AMF shall:

a) store the SMSF address in the UE 5GMM context if not stored already; and

b) store the value of the SMS allowed bit of the 5GS registration result IE in the UE 5GMM context and consider the UE available for SMS over NAS.

If SMSF selection in the AMF or SMS activation via the SMSF is not successful, or the AMF does not allow the use of SMS over NAS, then the AMF shall set the SMS allowed bit of the 5GS registration result IE to "SMS over NAS not allowed" in the REGISTRATION ACCEPT message.

If the 5GS update type IE was included in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS not supported" or the 5GS update type IE was not included in the REGISTRATION REQUEST message, then the AMF shall:

a) mark the 5GMM context to indicate that the UE is not available for SMS over NAS; and

NOTE 7: The AMF can notify the SMSF that the UE is deregistered from SMS over NAS based on local configuration.

b) set the SMS allowed bit of the 5GS registration result IE to "SMS over NAS not allowed" in the REGISTRATION ACCEPT message.

When the UE receives the REGISTRATION ACCEPT message, if the UE is also registered over another access to the same PLMN, the UE considers the value indicated by the SMS allowed bit of the 5GS registration result IE as applicable for both accesses over which the UE is registered.

If the 5GS update type IE was included in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed", the AMF shall delete the stored UE radio capability information or the UE radio capability ID, if any.

The AMF shall include the 5GS registration result IE in the REGISTRATION ACCEPT message. If the 5GS registration result IE value indicates:

a) "3GPP access", the UE:

- shall consider itself as being registered to 3GPP access only; and

- if in 5GMM-REGISTERED state over non-3GPP access and on the same PLMN as 3GPP access, shall enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION over non-3GPP access and set the 5GS update status to 5U2 NOT UPDATED over non-3GPP access;

b) "Non-3GPP access", the UE:

- shall consider itself as being registered to non-3GPP access only; and

- if in the 5GMM-REGISTERED state over 3GPP access and is on the same PLMN as non-3GPP access, shall enter the state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION over 3GPP access and set the 5GS update status to 5U2 NOT UPDATED over 3GPP access; or

c) "3GPP access and Non-3GPP access", the UE shall consider itself as being registered to both 3GPP access and non-3GPP access.

If the UE is not currently registered for emergency services and the 5GS registration result IE value in the REGISTRATION ACCEPT message is set to "Registered for emergency services", the UE shall consider itself registered for emergency services and shall locally release all non-emergency PDU sessions, if any.

The AMF shall include the allowed NSSAI for the current PLMN and shall include the mapped S-NSSAI(s) for the allowed NSSAI contained in the requested NSSAI (i.e. Requested NSSAI IE or Requested mapped NSSAI IE) from the UE if available, in the REGISTRATION ACCEPT message if the UE included the requested NSSAI in the REGISTRATION REQUEST message and the AMF allows one or more S-NSSAIs for the current PLMN in the Requested NSSAI IE or one or more mapped S-NSSAIs in the Requested NSSAI IE or Requested mapped NSSAI IE. The S-NSSAI associated with each of the active PDN connections for which interworking to 5GS is supported, shall be included in the allowed NSSAI if the UE included the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state" in the REGISTRATION REQUEST message and the AMF supports N26 interface.

The AMF may also include rejected NSSAI in the REGISTRATION ACCEPT message if the UE is not registered for onboarding services in SNPN. If the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message, the rejected NSSAI shall be included in the Extended rejected NSSAI IE in the REGISTRATION ACCEPT message; otherwise the rejected NSSAI shall be included in the Rejected NSSAI IE in the REGISTRATION ACCEPT message. If the UE is registered for onboarding services in SNPN, the AMF shall not include rejected NSSAI in the REGISTRATION ACCEPT message.

If the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message, the rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s); otherwise the rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s) with the following restrictions:

a) rejected NSSAI for the current PLMN or SNPN shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are not allowed; and

b) rejected NSSAI for the current registration area shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are not allowed.

NOTE 8: The UE that does not support extended rejected NSSAI can avoid requesting an S-NSSAI associated with a mapped S-NSSAI, which was included in the previous requested NSSAI but neither in the allowed NSSAI nor in the rejected NSSAI in the consequent registration procedures.

If the UE indicated the support for network slice-specific authentication and authorization, and if the requested NSSAI (i.e. the Requested NSSAI IE or the Requested mapped NSSAI IE) includes one or more S-NSSAIs subject to network slice-specific authentication and authorization, the AMF shall in the REGISTRATION ACCEPT message include:

a) the allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s), if any:

i) which are not subject to network slice-specific authentication and authorization and are allowed by the AMF; or

ii) for which the network slice-specific authentication and authorization has been successfully performed;

b) optionally, the rejected NSSAI;

c) pending NSSAI containing one or more S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing, and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing, if any; and

d) the "NSSAA to be performed" indicator in the 5GS registration result IE set to indicate that the network slice-specific authentication and authorization procedure will be performed by the network, if the allowed NSSAI is not included in the REGISTRATION ACCEPT message.

If the UE indicated the support for network slice-specific authentication and authorization, and if:

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

b) all subscribed S-NSSAIs marked as default are subject to network slice-specific authentication and authorization; and

c) the network slice-specific authentication and authorization procedure has not been successfully performed for any of the subscribed S-NSSAIs marked as default,

the AMF shall in the REGISTRATION ACCEPT message include:

a) the "NSSAA to be performed" indicator in the 5GS registration result IE to indicate that the network slice-specific authentication and authorization procedure will be performed by the network; and

b) pending NSSAI containing one or more subscribed S-NSSAIs marked as default for which network slice-specific authentication and authorization will be performed or is ongoing and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any); and

c) optionally, the rejected NSSAI.

If the UE indicated the support for network slice-specific authentication and authorization, and if:

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed; and

b) one or more subscribed S-NSSAIs marked as default are not subject to network slice-specific authentication and authorization or the network slice-specific authentication and authorization procedure has been successfully performed for one or more subscribed S-NSSAIs marked as default;

the AMF shall in the REGISTRATION ACCEPT message include:

a) pending NSSAI containing one or more subscribed S-NSSAIs marked as default for which network slice-specific authentication and authorization will be performed or is ongoing (if any) and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any);

b) allowed NSSAI containing S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed;

c) allowed NSSAI containing one or more subscribed S-NSSAIs marked as default, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed; and

d) optionally, the rejected NSSAI.

If the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed, the allowed NSSAI shall not contain subscribed S-NSSAI(s) marked as default subject to NSAC.

When the REGISTRATION ACCEPT includes a pending NSSAI, the pending NSSAI shall contain all S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing from the requested NSSAI of the REGISTRATION REQUEST message that was received over the 3GPP access, non-3GPP access, or both the 3GPP access and non-3GPP access.

If the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for all S-NSSAIs in the requested NSSAI as specified in subclause 4.6.2.5, the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the Extended rejected NSSAI IE in the REGISTRATION ACCEPT message. In addition, the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" included in the Extended rejected NSSAI IE of the REGISTRATION ACCEPT message.

If the UE does not indicate support for extended rejected NSSAI and the maximum number of UEs has been reached, the AMF should include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available in the current PLMN or SNPN" in the Rejected NSSAI IE and should not include these S-NSSAIs in the allowed NSSAI in the REGISTRATION ACCEPT message.

NOTE 9: Based on network policies, the AMF can include the S-NSSAI(s) for which the maximum number of UEs has been reached in the rejected NSSAI with rejection causes other than "S-NSSAI not available in the current PLMN or SNPN".

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

a) the REGISTRATION REQUEST message did not include a requested NSSAI and the UE is not registered for onboarding services in SNPN;

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

c) the REGISTRATION REQUEST message included a requested NSSAI containing an S-NSSAI with incorrect mapping information to an S-NSSAI of the HPLMN;

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

e) the REGISTRATION REQUEST message included the requested mapped NSSAI.

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

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

If the S-NSSAI(s) associated with the existing PDU session(s) of the UE is not included in the requested NSSAI (i.e. Requested NSSAI IE or Requested mapped NSSAI IE) of the REGISTRATION REQUEST message, the AMF shall perform a local release of the PDU session(s) associated with the S-NSSAI(s) except for a PDU session associated with DNN and S-NSSAI in the AMF onboarding configuration data and shall request the SMF to perform a local release of those PDU session(s).

The UE that has indicated the support for network slice-specific authentication and authorization receiving the pending NSSAI in the REGISTRATION ACCEPT message shall store the S-NSSAI(s) in the pending NSSAI as specified in subclause 4.6.2.2. If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the UE shall store the received pending NSSAI for each of the equivalent PLMNs as specified in subclause 4.6.2.2. If the pending NSSAI is not included in the REGISTRATION ACCEPT message and the "NSSAA to be performed" indicator is not set to "Network slice-specific authentication and authorization is to be performed" in the 5GS registration result IE of the REGISTRATION ACCEPT message, then the UE shall delete the pending NSSAI for the current PLMN or SNPN and its equivalent PLMN(s), if existing, as specified in subclause 4.6.2.2.

The UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

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

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

"S-NSSAI not available due to maximum number of UEs reached"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

Editor's note [WI: eNS-Ph2, CR#3417]: Whether "S-NSSAI not available due to maximum number of UEs reached" is applicable in an SNPN is FFS.

If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then the UE shall for each S-NSSAI behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running; and

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

If the UE sets the NSSAA bit in the 5GMM capability IE to "Network slice-specific authentication and authorization not supported", and:

a) if the Requested NSSAI IE only includes the S-NSSAI(s) subject to network slice-specific authentication and authorization and one or more subscribed S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) marked as default which are not subject to network slice-specific authentication and authorization are available, the AMF shall in the REGISTRATION ACCEPT message include:

1) the allowed NSSAI containing S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default which are not subject to network slice-specific authentication and authorization;

2) the allowed NSSAI containing the subscribed S-NSSAIs marked as default, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, which are not subject to network slice-specific authentication and authorization; and

3) the rejected NSSAI containing the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN", except if the UE has not set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the S-NSSAI(s) is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are subject to NSSAA; or

b) if the Requested NSSAI IE includes one or more S-NSSAIs subject to network slice-specific authentication and authorization, the AMF shall in the REGISTRATION ACCEPT message include:

1) the allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s) which are not subject to network slice-specific authentication and authorization; and

2) the rejected NSSAI containing:

i) the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN", except if the UE has not set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the S-NSSAI(s) is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are subject to NSSAA; and

ii) the S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN" or the rejection cause indicating "S-NSSAI not available in the current registration area", if any.

For a REGISTRATION REQUEST message with a 5GS registration type IE indicating "mobility registration updating", if the UE does not indicate support for network slice-specific authentication and authorization, the UE is not registered for onboarding services in SNPN, and:

a) the UE is not in NB-N1 mode; and

b) if:

1) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message; or

2) none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

and one or more subscribed S-NSSAIs marked as default which are not subject to network slice-specific authentication and authorization are available, the AMF shall:

a) put the allowed S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default and not subject to network slice-specific authentication and authorization in the allowed NSSAI of the REGISTRATION ACCEPT message;

b) put the subscribed S-NSSAIs marked as default and not subject to network slice-specific authentication and authorization, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, in the allowed NSSAI of the REGISTRATION ACCEPT message; and

c) determine a registration area such that all S-NSSAIs of the allowed NSSAI are available in the registration area.

During a registration procedure for mobility and periodic registration update for which the 5GS registration type IE indicates:

a) "periodic registration updating"; or

b) "mobility registration updating" and the UE is in NB-N1 mode;

and the UE is not registered for onboarding services in SNPN, the AMF:

a) may provide a new allowed NSSAI to the UE;

b) shall provide a pending NSSAI to the UE if the UE has indicated the support for network slice-specific authentication and authorization and there are S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing for the current PLMN or SNPN; or

c) may provide both a new allowed NSSAI and a pending NSSAI to the UE;

in the REGISTRATION ACCEPT message. Additionally, if a pending NSSAI is provided without an allowed NSSAI and no S-NSSAI is currently allowed for the UE, the REGISTRATION ACCEPT message shall include the 5GS registration result IE with the "NSSAA to be performed" indicator set to "Network slice-specific authentication and authorization is to be performed".

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

If the REGISTRATION ACCEPT message contains the allowed NSSAI, then the UE shall store the included allowed NSSAI together with the PLMN identity of the registered PLMN and the registration area as specified in subclause 4.6.2.2. If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the UE shall store the received allowed NSSAI in each of allowed NSSAIs which are associated with each of the PLMNs.

With respect to each of the PDU session(s) active in the UE, if the allowed NSSAI contains neither:

a) an S-NSSAI matching to the S-NSSAI of the PDU session; nor

b) a mapped S-NSSAI matching to the mapped S-NSSAI of the PDU session;

the UE shall perform a local release of all such PDU sessions except for an emergency PDU session, if any, and except for a PDU session established when the UE is registered for onboarding services in SNPN, if any.

For each of the PDU session(s) active in the UE, if the allowed NSSAI contains a mapped S-NSSAI matching to the mapped S-NSSAI of the PDU session, the UE shall locally update the S-NSSAI associated with the PDU session to the corresponding S-NSSAI received in the allowed NSSAI.

If the REGISTRATION ACCEPT message contains a configured NSSAI IE with a new configured NSSAI for the current PLMN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN, the UE shall store the contents of the configured NSSAI IE as specified in subclause 4.6.2.2.

If the REGISTRATION ACCEPT message:

a) includes the 5GS registration result IE with the "NSSAA to be performed" indicator set to "Network slice-specific authentication and authorization is to be performed";

b) includes a pending NSSAI; and

c) does not include an allowed NSSAI;

the UE:

a) shall not perform the registration procedure for mobility and registration update with the Uplink data status IE except for emergency services;

b) shall not initiate a service request procedure except for emergency services, for responding to paging or notification over non-3GPP access, for cases f) and i) in subclause 5.6.1.1;

c) shall not initiate a 5GSM procedure except for emergency services, indicating a change of 3GPP PS data off UE status, or to request the release of a PDU session; and

d) shall not initiate the NAS transport procedure except for sending a CIoT user data container, SMS, an LPP message, a location services message, an SOR transparent container, a UE policy container or a UE parameters update transparent container;

until the UE receives an allowed NSSAI.

During a registration procedure for mobility and periodic registration update for which the 5GS registration type IE indicates:

a) "mobility registration updating" and the UE is in NB-N1 mode; or

b) "periodic registration updating";

if the REGISTRATION ACCEPT message includes the 5GS registration result IE with the "NSSAA to be performed" indicator not set to "Network slice-specific authentication and authorization is to be performed" and the message does not contain an allowed NSSAI and no new allowed NSSAI, the UE shall consider the previously received allowed NSSAI as valid.

During a registration procedure for mobility and periodic registration update for which the 5GS registration type IE indicates:

a) "mobility registration updating"; or

b) "periodic registration updating";

if the REGISTRATION ACCEPT message includes the 5GS registration result IE with the "NSSAA to be performed" indicator set to "Network slice-specific authentication and authorization is to be performed" and the message contains a pending NSSAI, the UE shall delete any stored allowed NSSAI as specified in subclause 4.6.2.2.

If the Uplink data status IE is included in the REGISTRATION REQUEST message:

a) if the AMF determines that the UE is in non-allowed area or is not in allowed area, and the PDU session(s) indicated by the Uplink data status IE is non-emergency PDU session(s) or the UE is not configured for high priority access in selected PLMN, the AMF shall include the PDU session reactivation result IE in the REGISTRATION ACCEPT message indicating that user-plane resources for the corresponding PDU session(s) cannot be re-established, and shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "Restricted service area";

b) otherwise, the AMF shall:

1) indicate the SMF to re-establish the user-plane resources for the corresponding PDU session;

2) include PDU session reactivation result IE in the REGISTRATION ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources; and

3) determine the UE presence in LADN service area and forward the UE presence in LADN service area towards the SMF, if the corresponding PDU session is a PDU session for LADN.

If the Uplink data status IE is not included in the REGISTRATION REQUEST message and the REGISTRATION REQUEST message is sent for the trigger d) in subclause 5.5.1.3.2, the AMF may indicate the SMF to re-establish the user-plane resources for the PDU sessions.

If a PDU session status IE is included in the REGISTRATION REQUEST message:

a) for single access PDU sessions, the AMF shall:

1) perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE on the AMF side associated with the access type the REGISTRATION REQUEST message is sent over, but are indicated by the UE as being in 5GSM state PDU SESSION INACTIVE; and

2) include a PDU session status IE in the REGISTRATION ACCEPT message to indicate which PDU sessions associated with the access type the REGISTRATION ACCEPT message is sent over are not in 5GSM state PDU SESSION INACTIVE in the AMF; and

b) for MA PDU sessions:

1) for all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE and have user plane resources established on the access the REGISTRATION REQUEST message is sent over on the AMF side, but are indicated by the UE as no user plane resources established:

i) for PDU sessions having user plane resources established only on the access the REGISTRATION REQUEST message is sent over, the AMF shall perform a local release of all those PDU sessions; and

ii) for PDU sessions having user plane resources established on both accesses, the AMF shall perform a local release on the user plane resources associated with the access type the REGISTRATION REQUEST message is sent over; and

2) the AMF shall include a PDU session status IE in the REGISTRATION ACCEPT message to indicate which MA PDU sessions having user plane resources established on the AMF side on the access the REGISTRATION ACCEPT message is sent over.

If the Allowed PDU session status IE is included in the REGISTRATION REQUEST message, the AMF shall:

a) for a 5GSM message from each SMF that has indicated pending downlink signalling only, forward the received 5GSM message via 3GPP access to the UE after the REGISTRATION ACCEPT message is sent;

b) for each SMF that has indicated pending downlink data only:

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the Allowed PDU session status IE; and

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE.

c) for each SMF that have indicated pending downlink signalling and data:

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the Allowed PDU session status IE;

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE; and

3) discard the received 5GSM message for PDU session(s) associated with non-3GPP access; and

d) include the PDU session reactivation result IE in the REGISTRATION ACCEPT message to indicate the successfully re-established user-plane resources for the corresponding PDU sessions, if any.

If the PDU session reactivation result IE is included in the REGISTRATION ACCEPT message indicating that the user-plane resources have been successfully reactivated for a PDU session that was requested by the UE in the Allowed PDU session status IE, the UE considers the corresponding PDU session to be associated with the 3GPP access. If the user-plane resources of a PDU session have been successfully reactivated over the 3GPP access, the AMF and SMF update the associated access type of the corresponding PDU session.

If an EPS bearer context status IE is included in the REGISTRATION REQUEST message, the AMF handles the received EPS bearer context status IE as specified in 3GPP TS 23.502 [9].

If the EPS bearer context status information is generated for the UE during the inter-system change from S1 mode to N1 mode as specified in 3GPP TS 23.502 [9] and the AMF supports N26 interface, the AMF shall include an EPS bearer context status IE in the REGISTRATION ACCEPT message to indicate the UE which mapped EPS bearer contexts are active in the network.

If the user-plane resources cannot be established for a PDU session, the AMF shall include the PDU session reactivation result IE in the REGISTRATION ACCEPT message indicating that user-plane resources for the corresponding PDU session cannot be re-established, and:

a) if the user-plane resources cannot be established because the SMF indicated to the AMF that the UE is located out of the LADN service area (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #43 "LADN not available";

b) if the user-plane resources cannot be established because the SMF indicated to the AMF that only prioritized services are allowed (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "restricted service area"

c) if the user-plane resources cannot be established because the SMF indicated to the AMF that the resource is not available in the UPF (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #92 "insufficient user-plane resources for the PDU session"; or

d) otherwise, the AMF may include the PDU session reactivation result error cause IE to indicate the cause of failure to re-establish the user-plane resources.

NOTE 10: It is up to UE implementation when to re-send a request for user-plane re-establishment for the associated PDU session after receiving a PDU session reactivation result error cause IE with a 5GMM cause set to #92 "insufficient user-plane resources for the PDU session".

If the AMF needs to initiate PDU session status synchronization the AMF shall include a PDU session status IE in the REGISTRATION ACCEPT message to indicate the UE:

- which single access PDU sessions associated with the access the REGISTRATION ACCEPT message is sent over are not in 5GSM state PDU SESSION INACTIVE in the AMF; and

- which MA PDU sessions are not in 5GSM state PDU SESSION INACTIVE and having user plane resources established in the AMF on the access the REGISTRATION ACCEPT message is sent over.

The AMF may include the LADN information IE in the REGISTRATION ACCEPT message as described in subclause 5.5.1.2.4. The UE, upon receiving the REGISTRATION ACCEPT message with the LADN information IE, shall delete its old LADN information (if any) and store the received new LADN information.

If the AMF does not include the LADN information IE in the REGISTATION ACCEPT message during registration procedure for mobility and registration update, the UE shall delete its old LADN information.

If the PDU session status IE is included in the REGISTRATION ACCEPT message:

a) for single access PDU sessions, the UE shall perform a local release of all those PDU sessions associated with the access type the REGISTRATION ACCEPT message is sent over which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING on the UE side, but are indicated by the AMF as being in 5GSM state PDU SESSION INACTIVE; and

b) for MA PDU sessions, for all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING and have user plane resources established in the UE on the access the REGISTRATION ACCEPT message is sent over, but are indicated by the AMF as no user plane resources established:

1) for MA PDU sessions having user plane resources established only on the access the REGISTRATION ACCEPT message is sent over, the UE shall perform a local release of those MA PDU sessions; and

2) for MA PDU sessions having user plane resources established on both accesses, the UE shall perform a local release on the user plane resources on the access the REGISTRATION ACCEPT message is sent over.

If:

a) the UE included a PDU session status IE in the REGISTRATION REQUEST message;

b) the UE is operating in the single-registration mode;

c) the UE is performing inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode; and

d) the UE has received the IWK N26 bit set to "interworking without N26 interface supported";

the UE shall ignore the PDU session status IE if received in the REGISTRATION ACCEPT message.

If the EPS bearer context status IE is included in the REGISTRATION ACCEPT message, the UE shall locally delete all those QoS flow descriptions and all associated QoS rules, if any, which are associated with inactive EPS bearer contexts as indicated by the AMF in the EPS bearer context status IE.

If the UE included S1 mode supported indication in the REGISTRATION REQUEST message, the AMF supporting inter-system change with EPS shall set the IWK N26 bit to either:

a) "interworking without N26 interface not supported" if the AMF supports N26 interface; or

b) "interworking without N26 interface supported" if the AMF does not support N26 interface

in the 5GS network feature support IE in the REGISTRATION ACCEPT message.

The UE supporting S1 mode shall operate in the mode for inter-system interworking with EPS as follows:

a) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface not supported", the UE shall operate in single-registration mode;

b) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE supports dual-registration mode, the UE may operate in dual-registration mode; or

NOTE 11: The registration mode used by the UE is implementation dependent.

c) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE only supports single-registration mode, the UE shall operate in single-registration mode.

The UE shall treat the received interworking without N26 interface indicator for inter-system change with EPS as valid in the entire PLMN and its equivalent PLMN(s).

The network informs the UE about the support of specific features, such as IMS voice over PS session, location services (5G-LCS), emergency services, emergency services fallback and ATSSS, in the 5GS network feature support information element. In a UE with IMS voice over PS session capability, the IMS voice over PS session indicator, Emergency services support indicator and Emergency services fallback indicator shall be provided to the upper layers. The upper layers take the IMS voice over PS session indicator into account when selecting the access domain for voice sessions or calls. When initiating an emergency call, the upper layers take the IMS voice over PS session indicator, Emergency services support indicator and Emergency services fallback indicator into account for the access domain selection. When the UE determines via the IMS voice over PS session indicator that the network does not support IMS voice over PS sessions in N1 mode, then the UE shall not perform a local release of any persistent PDU session if the AMF does not indicate that the PDU session is in 5GSM state PDU SESSION INACTIVE via the PDU session status IE. When the UE determines via the Emergency services support indicator that the network does not support emergency services in N1 mode, then the UE shall not perform a local release of any emergency PDU session if user-plane resources associated with that emergency PDU session are established if the AMF does not indicate that the PDU session is in 5GSM state PDU SESSION INACTIVE via the PDU session status IE. In a UE with LCS capability, location services indicators (5G-LCS) shall be provided to the upper layers. In a UE with the capability for ATSSS, the network support for ATSSS shall be provided to the upper layers. In a UE with the capability for ATSSS, the network support for ATSSS shall be provided to the upper layers. If the UE receives the 5GS network feature support IE with the ATSSS support indicator set to "ATSSS not supported", the UE shall perform a local release of the MA PDU session, if any.

The AMF shall set the EMF bit in the 5GS network feature support IE to:

a) "Emergency services fallback supported in NR connected to 5GCN and E-UTRA connected to 5GCN" if the network supports the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN or an E-UTRA cell connected to 5GCN;

b) "Emergency services fallback supported in NR connected to 5GCN only" if the network supports the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN and does not support the emergency services fallback procedure when the UE is in an E-UTRA cell connected to 5GCN;

c) "Emergency services fallback supported in E-UTRA connected to 5GCN only" if the network supports the emergency services fallback procedure when the UE is in an E-UTRA cell connected to 5GCN and does not support the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN; or

d) "Emergency services fallback not supported" if network does not support the emergency services fallback procedure when the UE is in any cell connected to 5GCN.

NOTE 12: If the emergency services are supported in neither the EPS nor the 5GS homogeneously, based on operator policy, the AMF will set the EMF bit in the 5GS network feature support IE to "Emergency services fallback not supported".

NOTE 13: Even though the AMF's support of emergency services fallback is indicated per RAT, the UE's support of emergency services fallback is not per RAT, i.e. the UE's support of emergency services fallback is the same for both NR connected to 5GCN and E-UTRA connected to 5GCN.

If the UE is not operating in SNPN access operation mode:

a) the network informs the UE that the use of access identity 1 is valid in the RPLMN or equivalent PLMN by setting the MPS indicator bit of the 5GS network feature support IE to "Access identity 1 valid", in the REGISTRATION ACCEPT message. Based on operator policy, the AMF sets the MPS indicator bit in the REGISTRATION ACCEPT message based on the MPS priority information in the user's subscription context obtained from the UDM;

b) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid", the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2, in all NG-RAN of the registered PLMN and its equivalent PLMNs. The MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid until the UE receives a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 not valid" or until the UE selects a non-equivalent PLMN. Access identity 1 is only applicable while the UE is in N1 mode;

c) during ongoing active PDU sessions that were set up relying on the MPS indicator bit being set to "Access identity 1 valid", if the network indicates in a registration update that the MPS indicator bit is reset to "Access identity 1 not valid", then the UE shall no longer act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2 unless the USIM contains a valid configuration for access identity 1 in RPLMN or equivalent PLMN. In the UE, the ongoing active PDU sessions are not affected by the change of the MPS indicator bit;

d) the network informs the UE that the use of access identity 2 is valid in the RPLMN or equivalent PLMN by setting the MCS indicator bit of the 5GS network feature support IE to "Access identity 2 valid", in the REGISTRATION ACCEPT message. Based on operator policy, the AMF sets the MCS indicator bit in the REGISTRATION ACCEPT message based on the MCS priority information in the user's subscription context obtained from the UDM;

e) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid", the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2, in all NG-RAN of the registered PLMN and its equivalent PLMNs. The MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid until the UE receives a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 not valid" or until the UE selects a non-equivalent PLMN. Access identity 2 is only applicable while the UE is in N1 mode; and

f) during ongoing active PDU sessions that were set up relying on the MCS indicator bit being set to "Access identity 2 valid", if the network indicates in a registration update that the MCS indicator bit is reset to "Access identity 2 not valid", then the UE shall no longer act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2 unless the USIM contains a valid configuration for access identity 2 in RPLMN or equivalent PLMN. In the UE, the ongoing active PDU sessions are not affected by the change of the MCS indicator bit.

If the UE indicates support for restriction on use of enhanced coverage in the REGISTRATION REQUEST message and:

a) in WB-N1 mode, the AMF decides to restrict the use of CE mode B for the UE, then the AMF shall set the RestrictEC bit to "CE mode B is restricted";

b) in WB-N1 mode, the AMF decides to restrict the use of both CE mode A and CE mode B for the UE, then the AMF shall set the RestrictEC bit to " Both CE mode A and CE mode B are restricted"; or

c) in NB-N1 mode, the AMF decides to restrict the use of enhanced coverage for the UE, then the AMF shall set the RestrictEC bit to "Use of enhanced coverage is restricted",

in the 5GS network feature support IE in the REGISTRATION ACCEPT message.

If the UE is operating in SNPN access operation mode:

a) the network informs the UE that the use of access identity 1 is valid in the RSNPN by setting the MPS indicator bit of the 5GS network feature support IE to "Access identity 1 valid", in the REGISTRATION ACCEPT message. Based on operator policy, the AMF sets the MPS indicator bit in the REGISTRATION ACCEPT message based on the MPS priority information in the user's subscription context obtained from the UDM;

b) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid", the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2A, in all NG-RAN of the registered SNPN. The MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid until the UE receives a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 not valid" or until the UE selects another SNPN. Access identity 1 is only applicable while the UE is in N1 mode;

c) during ongoing active PDU sessions that were set up relying on the MPS indicator bit being set to "Access identity 1 valid", if the network indicates in a registration update that the MPS indicator bit is reset to "Access identity 1 not valid", then the UE shall no longer act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2A unless the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) indicates the UE is configured for access identity 1 in the RSNPN. In the UE, the ongoing active PDU sessions are not affected by the change of the MPS indicator bit;

d) the network informs the UE that the use of access identity 2 is valid in the RSNPN by setting the MCS indicator bit of the 5GS network feature support IE to "Access identity 2 valid", in the REGISTRATION ACCEPT message. Based on operator policy, the AMF sets the MCS indicator bit in the REGISTRATION ACCEPT message based on the MCS priority information in the user's subscription context obtained from the UDM;

e) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid", the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2A, in all NG-RAN of the registered SNPN. The MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid until the UE receives a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 not valid" or until the UE selects another SNPN. Access identity 2 is only applicable while the UE is in N1 mode; and

f) during ongoing active PDU sessions that were set up relying on the MCS indicator bit being set to "Access identity 2 valid", if the network indicates in a registration update that the MCS indicator bit is reset to "Access identity 2 not valid", then the UE shall no longer act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2A unless the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) indicates the UE is configured for access identity 2 in the RSNPN. In the UE, the ongoing active PDU sessions are not affected by the change of the MCS indicator bit.

If the UE has set the Follow-on request indicator to "Follow-on request pending" in the REGISTRATION REQUEST message, or the network has downlink signalling pending, the AMF shall not immediately release the NAS signalling connection after the completion of the registration procedure.

If the UE is authorized to use V2X communication over PC5 reference point based on:

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE, or already stored in the 5GMM context in the AMF during the previous registration procedure as follows:

1) the V2XCEPC5 bit to "V2X communication over E-UTRA-PC5 supported"; or

2) the V2XCNPC5 bit to "V2X communication over NR-PC5 supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.287 [6C];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure.

If the UE is authorized to use ProSe services based on:

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE, or already stored in the 5GMM context in the AMF during the previous registration procedure as follows:

1) the ProSe direct discovery bit to " ProSe direct discovery supported"; or

2) the ProSe direct communication bit to "ProSe direct communication supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.304 [6E];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure.

If the Requested DRX parameters IE was included in the REGISTRATION REQUEST message, the AMF shall include the Negotiated DRX parameters IE in the REGISTRATION ACCEPT message. The AMF may set the Negotiated DRX parameters IE based on the received Requested DRX parameters IE and operator policy if available.

If the Requested NB-N1 mode DRX parameters IE was included in the REGISTRATION REQUEST message, the AMF shall include the Negotiated NB-N1 mode DRX parameters IE in the REGISTRATION ACCEPT message. The AMF may set the Negotiated NB-N1 mode DRX parameters IE based on the received Requested NB-N1 mode DRX parameters IE and operator policy if available.

The AMF shall include the Negotiated extended DRX parameters IE in the REGISTRATION ACCEPT message only if the Requested extended DRX parameters IE was included in the REGISTRATION REQUEST message, and the AMF supports and accepts the use of eDRX. The AMF may set the Negotiated extended DRX parameters IE based on the received Requested extended DRX parameters IE, operator policy, and the user's subscription context obtained from the UDM if available.

If the UE included in the REGISTRATION REQUEST message the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state" and the AMF does not support N26 interface, the AMF shall operate as described in subclause 5.5.1.2.4.

If the UE has indicated support for service gap control in the REGISTRATION REQUEST message, a service gap time value is available in the 5GMM context, the AMF may include the T3447 value IE set to the service gap time value in the REGISTRATION ACCEPT message.

If the UE requests ciphering keys for ciphered broadcast assistance data in the REGISTRATION REQUEST message and the AMF has valid ciphering key data applicable to the UE's subscription and current tracking area, then the AMF shall include the ciphering key data in the Ciphering key data IE of the REGISTRATION ACCEPT message.

If the UE supports WUS assistance information and the AMF supports and accepts the use of WUS assistance information for the UE, then the AMF shall determine the negotiated UE paging probability information for the UE, store it in the 5GMM context of the UE, and include it in the Negotiated WUS assistance information IE in the REGISTRATION ACCEPT message. The AMF may consider the UE paging probability information received in the Requested WUS assistance information IE when determining the negotiated UE paging probability information for the UE.

NOTE 14: Besides the UE paging probability information requested by the UE, the AMF can take local configuration or previous statistical information for the UE into account when determining the negotiated UE paging probability information for the UE.

If due to regional subscription restrictions or access restrictions the UE is not allowed to access the TA or due to CAG restrictions the UE is not allowed to access the cell, but the UE has an emergency PDU session established, the AMF may accept the REGISTRATION REQUEST message and indicate to the SMF to perform a local release of all non-emergency PDU sessions (associated with 3GPP access if it is due to CAG restrictions) and informs the UE via the PDU session status IE in the REGISTRATION ACCEPT message. The AMF shall not indicate to the SMF to release the emergency PDU session. If the AMF indicated to the SMF to perform a local release of all non-emergency PDU sessions (associated with 3GPP access if it is due to CAG restrictions), the network shall behave as if the UE is registered for emergency services and shall set the 5GS registration result IE value to "Registered for emergency services" in the REGISTRATION ACCEPT message.

If the REGISTRATION ACCEPT message includes the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "Restricted service area", the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE and behave as specified in subclause 5.3.5.

If the REGISTRATION ACCEPT message includes the SOR transparent container IE and:

a) the SOR transparent container IE does not successfully pass the integrity check (see 3GPP TS 33.501 [24]); and

b) if the UE attempts obtaining service on another PLMNs as specified in 3GPP TS 23.122 [5] annex C;

then the UE shall release locally the established NAS signalling connection after sending a REGISTRATION COMPLETE message.

If the REGISTRATION ACCEPT message includes the SOR transparent container IE and the SOR transparent container IE successfully passes the integrity check (see 3GPP TS 33.501 [24]), the ME shall store the received SOR counter as specified in annex C and proceed as follows:

a) the UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; and

b) if the registration procedure is performed over 3GPP access and the UE attempts obtaining service on another PLMNs as specified in 3GPP TS 23.122 [5] annex C then the UE may release locally the established NAS signalling connection after sending a REGISTRATION COMPLETE message. Otherwise the UE shall send a REGISTRATION COMPLETE message and not release the current N1 NAS signalling connection locally. If an acknowledgement is requested in the SOR transparent container IE of the REGISTRATION ACCEPT message, the UE acknowledgement is included in the SOR transparent container IE of the REGISTRATION COMPLETE message. In the SOR transparent container IE carrying the acknowledgement, the UE shall set the ME support of SOR-CMCI indicator to "SOR-CMCI supported by the ME".

If the SOR transparent container IE successfully passes the integrity check (see 3GPP TS 33.501 [24]) , and:

a) 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 and shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C.

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

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

and the UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C.

If the SOR transparent container IE does not pass the integrity check successfully, then the UE shall discard the content of the SOR transparent container IE.

If required by operator policy, the AMF shall include the NSSAI inclusion mode IE in the REGISTRATION ACCEPT message (see table 4.6.2.3.1 of subclause 4.6.2.3). Upon receipt of the REGISTRATION ACCEPT message:

a) if the message includes the NSSAI inclusion mode IE, the UE shall operate in the NSSAI inclusion mode indicated in the NSSAI inclusion mode IE over the current access within the current PLMN and its equivalent PLMN(s), if any, in the current registration area; or

b) otherwise:

1) if the UE has NSSAI inclusion mode for the current PLMN and access type stored in the UE, the UE shall operate in the stored NSSAI inclusion mode;

2) if the UE does not have NSSAI inclusion mode for the current PLMN and the access type stored in the UE and if the UE is performing the registration procedure over:

i) 3GPP access, the UE shall operate in NSSAI inclusion mode D in the current PLMN and the current access type;

ii) untrusted non-3GPP access, the UE shall operate in NSSAI inclusion mode C in the current PLMN and the current access type; or

iii) trusted non-3GPP access, the UE shall operate in NSSAI inclusion mode D in the current PLMN and the current access type; or

3) if the 5G-RG does not have NSSAI inclusion mode for the current PLMN and wireline access stored in the 5G-RG, and the 5G-RG is performing the registration procedure over wireline access, the 5G-RG shall operate in NSSAI inclusion mode B in the current PLMN and the current access type.

The AMF may include operator-defined access category definitions in the REGISTRATION ACCEPT message.

If there is a running T3447 timer in the AMF and the Uplink data status IE is included or the Follow-on request indicator is set to "Follow-on request pending" in the REGISTRATION REQUEST message, the AMF shall ignore the Uplink data status IE or that the Follow-on request indicator is set to "Follow-on request pending" and proceed as if the Uplink data status IE was not received or the Follow-on request indicator was not set to "Follow-on request pending" except for the following case:

- the PDU session(s) indicated by the Uplink data status IE is emergency PDU session(s);

- the UE is configured for high priority access in selected PLMN;

- the REGISTRATION REQUEST message is as a paging response; or

- the UE is establishing an emergency PDU session or performing emergency services fallback.

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

If the UE has indicated support for service gap control in the REGISTRATION REQUEST message and:

- the REGISTRATION ACCEPT message contains the T3447 value IE, then the UE shall store the new T3447 value, erase any previous stored T3447 value if exists and use the new T3447 value with the timer T3447 next time it is started; or

- the REGISTRATION ACCEPT message does not contain the T3447 value IE, then the UE shall erase any previous stored T3447 value if exists and stop the timer T3447 if running.

If the REGISTRATION ACCEPT message contains the Truncated 5G-S-TMSI configuration IE, then the UE shall store the included truncated 5G-S-TMSI configuration and return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the truncated 5G-S-TMSI configuration.

NOTE 15: The UE provides the truncated 5G-S-TMSI configuration to the lower layers.

If the UE is not in NB-N1 mode, the UE has set the RACS bit to "RACS supported" in the 5GMM Capability IE of the REGISTRATION REQUEST message, and the REGISTRATION ACCEPT message includes:

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested", the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription stored at the UE, then the UE shall initiate a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3.2 over the existing N1 NAS signalling connection; or

b) a UE radio capability ID IE, the UE shall store the UE radio capability ID as specified in annex C.

If the registration procedure for mobility and periodic registration update was initiated and there is a request from the upper layers to perform "emergency services fallback" pending, the UE shall restart the service request procedure after the successful completion of the mobility and periodic registration update.

If the UE has included the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message contains the Service-level AA pending indication IE, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the Service-level-AA pending indication IE, and the UE shall not attempt to perform another registration procedure for UAS services until the UUAA-MM procedure is completed, or to establish a PDU session for USS communication or a PDU session for C2 communication until the UUAA-MM procedure is completed successfully.

If the UE has included the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message does not contain the Service-level-AA pending indication IE, the UE shall consider the UUAA-MM procedure is not triggered.

Editor's note: It is FFS whether the Service-level-AA pending indication is included in the service-level AA container IE.

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

##### 5.5.1.3.5 Mobility and periodic registration update not accepted by the network

If the mobility and periodic registration update request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the mobility and periodic registration update request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

In NB-N1 mode, if the mobility and periodic registration update request is rejected due to operator determined barring (see 3GPP TS 29.503 [20AB]), the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

When the UE performs inter-system change from S1 mode to N1 mode, if the AMF is informed that verification of the integrity protection of the TRACKING AREA UPDATE REQUEST message included by the UE in the EPS NAS message container IE of the REGISTRATION REQUEST message has failed in the MME, then:

a) If the AMF can retrieve the current 5G NAS security context as indicated by the ngKSI and 5G-GUTI sent by the UE, the AMF shall proceed as specified in subclause 5.5.1.3.4;

b) if the AMF cannot retrieve the current 5G NAS security context as indicated by the ngKSI and 5G-GUTI sent by the UE, or the ngKSI or 5G-GUTI was not sent by the UE, the AMF may initiate the identification procedure by sending the IDENTITY REQUEST message with the "Type of identity" of the 5GS identity type IE set to "SUCI" before taking actions as specified in subclause 4.4.4.3; or

c) If the AMF needs to reject the mobility and periodic registration update procedure, the AMF shall send REGISTRATION REJECT message including 5GMM cause #9 "UE identity cannot be derived by the network".

If the REGISTRATION REJECT message with 5GMM cause #76 or #78 was received without integrity protection, then the UE shall discard the message. If the REGISTRATION REJECT message with 5GMM cause #62 was received without integrity protected, the behaviour of the UE is specified in subclause 5.3.20.2.

Based on operator policy, if the mobility and periodic registration update request is rejected due to core network redirection for CIoT optimizations, the network shall set the 5GMM cause value to #31 "Redirection to EPC required".

NOTE 1: The network can take into account the UE's S1 mode capability, the EPS CIoT network behaviour supported by the UE or the EPS CIoT network behaviour supported by the EPC to determine the rejection with the 5GMM cause value #31 "Redirection to EPC required".

If the mobility and periodic registration update request is rejected because:

a) all the S-NSSAI(s) included in the requested NSSAI (i.e. Requested NSSAI IE or Requested mapped NSSAI IE) are either rejected for the current registration area, rejected for the current PLMN, rejected for the failed or revoked NSSAA or rejected for the maximum number of UEs reached;

b) the UE set the NSSAA bit in the 5GMM capability IE to:

1) "Network slice-specific authentication and authorization supported" and;

i) there are no subscribed S-NSSAIs marked as default;

ii) all subscribed S-NSSAIs marked as default are not allowed; or

iii) network slice-specific authentication and authorization has failed or been revoked for all subscribed S-NSSAIs marked as default and based on network local policy, the network decides not to initiate the network slice-specific re-authentication and re-authorization procedures for any subscribed S-NSSAI marked as default requested by the UE; or

2) "Network slice-specific authentication and authorization not supported" and;

i) there are no subscribed S-NSSAIs which are marked as default; or

ii) all subscribed S-NSSAIs marked as default are either not allowed or are subject to network slice-specific authentication and authorization; and

c) no emergency PDU session has been established for the UE;

the network shall set the 5GMM cause value to #62 "No network slices available". If the UE had included requested NSSAI in the REGISTRATION REQUEST message, then the network shall include the rejected S-NSSAI(s) in the rejected NSSAI of the REGISTRATION REJECT message. Otherwise, the network may include the rejected S-NSSAI(s) in the rejected NSSAI of the REGISTRATION REJECT message.

If the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message, the rejected S-NSSAI(s) shall be included in the Extended rejected NSSAI IE of the REGISTRATION REJECT message. Otherwise the rejected S-NSSAI(s) shall be included in the Rejected NSSAI IE of the REGISTRATION REJECT message.

If the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for one or more S-NSSAI(s) in the requested NSSAI as specified in subclause 4.6.2.5, the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the Extended rejected NSSAI IE in the REGISTRATION REJECT message. In addition, the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the Extended rejected NSSAI IE of the REGISTRATION REJECT message.

If the mobility and periodic registration update request from a UE supporting CAG is rejected due to CAG restrictions, the network shall set the 5GMM cause value to #76 "Not authorized for this CAG or authorized for CAG cells only" and should include the "CAG information list" in the CAG information list IE in the REGISTRATION REJECT message.

NOTE 2: The network cannot be certain that "CAG information list" stored in the UE is updated as result of sending of the REGISTRATION REJECT message with the CAG information list IE, as the REGISTRATION REJECT message is not necessarily delivered to the UE (e.g due to abnormal radio conditions).

NOTE 3: The "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription.

If the mobility and periodic registration update request from a UE not supporting CAG is rejected due to CAG restrictions, the network shall operate as described in bullet i) of subclause 5.5.1.3.8.

If the UE's mobility and periodic registration update request is via a satellite NG-RAN cell and the network determines that the UE is in a location where the network is not allowed to operate, see 3GPP TS 23.502 [9], the network shall set the 5GMM cause value in the REGISTRATION REJECT message to #78 "PLMN not allowed at the present UE location" and may include an information element in the REGISTRATION REJECT message to indicate the country of the UE location.

Editor's note: [5GSAT\_ARCH-CT, CR#3217]. The name and the encoding of the information element providing the country of the UE location is FFS

If the AMF receives the mobility and periodic registration update request including the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE and the AMF determines that the UE is not allowed to use UAS services via 5GS based on the user's subscription data and the operator policy, the AMF shall return a REGISTRATION REJECT message with 5GMM cause #79 (UAS services not allowed).

Editor's note: It is FFS whether AMF can accept the registration request due to allowed S-NSSAI(s) other than the one for UAS services, which will be based on the stage-2 requirement if available.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

#3 (Illegal UE); or

#6 (Illegal ME).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

 In case of PLMN, the UE shall consider the USIM as invalid for 5GS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.1.

 In case of SNPN, if the UE does not support access to an SNPN using credentials from a credentials holder, the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. In case of SNPN, if the UE supports access to an SNPN using credentials from a credentials holder, the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. Additionally, if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN, the UE shall consider the USIM as invalid for the current SNPN until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.2.

 The UE shall delete the list of equivalent PLMNs (if any) and shall move to 5GMM-DEREGISTERED.NO-SUPI state. If the message has been successfully integrity checked by the NAS, then the UE shall:

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN if the UE maintains these counters;

3) delete the 5GMM parameters stored in non-volatile memory of the ME as specified in annex C.

 to UE implementation-specific maximum value.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value. The USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a in 3GPP TS 24.301 [15]. If the UE is in EMM-REGISTERED state, the UE shall move to EMM-DEREGISTERED state. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#7 (5GS services not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

 In case of PLMN, the UE shall consider the USIM as invalid for 5GS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.1;

 In case of SNPN, if the UE does not support access to an SNPN using credentials from a credentials holder, the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 5GS services until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. In case of SNPN, if the UE supports access to an SNPN using credentials from a credentials holder, the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. Additionally, if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN, the UE shall consider the USIM as invalid for the current SNPN until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.2.

 The UE shall move to 5GMM-DEREGISTERED.NO-SUPI state. If the message has been successfully integrity checked by the NAS, then the UE shall:

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN if the UE maintains these counters;

 to UE implementation-specific maximum value.

3) delete the 5GMM parameters stored in non-volatile memory of the ME as specified in annex C.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#9 (UE identity cannot be derived by the network).

 The UE shall set the 5GS update status to 5U2 NOT UPDATED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall enter the state 5GMM-DEREGISTERED.

 If the UE has initiated the registration procedure in order to enable performing the service request procedure for emergency services fallback, the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6]. If the UE finds a suitable E-UTRA cell, it then proceeds with the appropriate EMM or 5GMM procedures. If the UE operating in single-registration mode has changed to S1 mode, it shall disable the N1 mode capability for 3GPP access.

 If the rejected request was neither for initiating an emergency PDU session nor for emergency services fallback, the UE shall subsequently, automatically initiate the initial registration procedure.

NOTE 4: User interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

#10 (implicitly de-registered).

 The UE shall enter the state 5GMM-DEREGISTERED.NORMAL-SERVICE. The UE shall delete any mapped 5G NAS security context or partial native 5G NAS security context.

 If the UE has initiated the registration procedure in order to enable performing the service request procedure for emergency services fallback, the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6]. If the UE finds a suitable E-UTRA cell, it then proceeds with the appropriate EMM or 5GMM procedures.

 If the rejected request was neither for initiating an emergency PDU session nor for emergency services fallback, the UE shall perform a new registration procedure for initial registration.

NOTE 5: User interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM state as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

#11 (PLMN not allowed).

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in clause 5.3.19a.1, delete the list of equivalent PLMNs, reset the registration attempt counter. For 3GPP access, the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5]. For non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18]. If the message has been successfully integrity checked by the NAS and the UE mantains the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN, the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same PLMN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#12 (Tracking area not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter.

 If:

1) the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, for non-integrity protected NAS reject message.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

#13 (Roaming not allowed in this tracking area).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete the list of equivalent PLMNs (if available). The UE shall reset the registration attempt counter. For 3GPP acess the UE shall change to state 5GMM-REGISTERED.PLMN-SEARCH, and for non-3GPP access the UE shall change to state 5GMM-REGISTERED.LIMITED-SERVICE.

 If the UE is registered in S1 mode and operating in dual-registration mode, the PLMN that the UE chooses to register in is specified in subclause 4.8.3. Otherwise if:

1) the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and shall remove the current TAI from the stored TAI list if present. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, for non-integrity protected NAS reject message.

 For 3GPP access the UE shall perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5], and for non-3GPP access the UE shall perform network selection as defined in 3GPP TS 24.502 [18].

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

#15 (No suitable cells in tracking area).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2). The UE shall reset the registration attempt counter and shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE.

 If the UE has initiated the registration procedure in order to enable performing the service request procedure for emergency services fallback, the UE shall attempt to select an E-UTRA cell connected to EPC or 5GC according to the emergency services support indicator (see 3GPP TS 36.331 [25A]). If the UE finds a suitable E-UTRA cell, it then proceeds with the appropriate EMM or 5GMM procedures. If the UE operating in single-registration mode has changed to S1 mode, it shall disable the N1 mode capability for 3GPP access. Otherwise, the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C].

 If:

1) the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and shall remove the current TAI from the stored TAI list, if present. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, and shall remove the current TAI from the stored TAI list, if present. If the REGISTRATION REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, for non-integrity protected NAS reject message.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

 If received over non-3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.3.7.

#22 (Congestion).

 If the T3346 value IE is present in the REGISTRATION REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below, otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.3.7.

 The UE shall abort the registration procedure for mobility and periodic registration update. If the rejected request was not for initiating an emergency PDU session, the UE shall set the 5GS update status to 5U2 NOT UPDATED, reset the registration attempt counter and change to state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE.

 The UE shall stop timer T3346 if it is running.

 If the REGISTRATION REJECT message is integrity protected, the UE shall start timer T3346 with the value provided in the T3346 value IE.

 If the REGISTRATION REJECT message is not integrity protected, the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [12].

 The UE stays in the current serving cell and applies the normal cell reselection process. The registration procedure for mobility and periodic registration update is started, if still necessary, when timer T3346 expires or is stopped.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

 If the registration procedure for mobility and periodic registration update was initiated for an MO MMTEL voice call (i.e. access category 4), or an MO MMTEL video call (i.e. access category 5), or an MO IMS registration related signalling (i.e. access category 9) or for NAS signalling connection recovery during an ongoing MO MMTEL voice call (i.e. access category 4), or during an ongoing MO MMTEL video call (i.e. access category 5) or during an ongoing MO IMS registration related signalling (i.e. access category 9), then a notification that the request was not accepted due to network congestion shall be provided to upper layers.

NOTE 6: Upper layers specified in 3GPP TS 24.173 [13C] and 3GPP TS 24.229 [14] handle the notification that the request was not accepted due to network congestion.

#27 (N1 mode not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2). Additionally, the UE shall reset the registration attempt counter and shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE. If the message has been successfully integrity checked by the NAS, the UE shall set:

1) the PLMN-specific N1 mode attempt counter for 3GPP access and the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for 3GPP access for the current SNPN and the SNPN-specific attempt counter for non-3GPP access for the current SNPN in case of SNPN;

 to the UE implementation-specific maximum value.

 The UE shall disable the N1 mode capability for the specific access type for which the message was received (see subclause 4.9).

 If the message has been successfully integrity checked by the NAS, the UE shall disable the N1 mode capability also for the other access type (see subclause 4.9).

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED. Additionally, the UE shall reset the tracking area updating attempt counter and enter the state EMM-REGISTERED.

#31 (Redirection to EPC required).

 5GMM cause #31 received by a UE that has not indicated support for CIoT optimizations or not indicated support for S1 mode or received by a UE over non-3GPP access is considered an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7.

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2). The UE shall reset the registration attempt counter and enter the state 5GMM- REGISTERED.LIMITED-SERVICE.

 The UE shall enable the E-UTRA capability if it was disabled and disable the N1 mode capability for 3GPP access (see subclause 4.9.2).

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

#62 (No network slices available).

 The UE shall abort the registration procedure for mobility and periodic registration update procedure, set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE. Additionally, the UE shall reset the registration attempt counter.

 The UE receiving the rejected NSSAI in the REGISTRATION REJECT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

 "S-NSSAI not available in the current PLMN or SNPN"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN until switching off the UE, the UICC containing the USIM is removed, an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

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

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

 "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

 "S-NSSAI not available due to maximum number of UEs reached"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

Editor's note [WI: eNS-Ph2, CR#3417]: Whether "S-NSSAI not available due to maximum number of UEs reached" is applicable in an SNPN is FFS.

 If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then the UE shall for each S-NSSAI behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running; and

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

 If the UE has an allowed NSSAI or configured NSSAI that contains S-NSSAIs which are not included in the rejected NSSAI, the UE may stay in the current serving cell, apply the normal cell reselection process and start a registration procedure for mobility and periodic registration update with a requested NSSAI that includes any S-NSSAI from the allowed S-NSSAI or the configured NSSAI that is not in the rejected NSSAI. Otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally, the UE may disable the N1 mode capability for the current PLMN or SNPN if the UE does not have an allowed NSSAI and each S-NSSAI in the configured NSSAI, if available, was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9.

 If the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN and has a default configured NSSAI containing one or more S-NSSAIs that are not included in the rejected NSSAI,

1) the UE may stay in the current serving cell, apply the normal cell reselection process, and start a registration procedure for mobility and periodic registration update with a requested NSSAI with that default configured NSSAI; or

2) if all the S-NSSAI(s) in the default configured NSSAI are rejected and at least one S-NSSAI is rejected due to "S-NSSAI not available in the current registration area",

i) if the REGISTRATION REJECT message is integrity protected and the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-REGISTERED.LIMITED-SERVICE; or

ii) If the REGISTRATION REJECT message is integrity protected and the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and enter the state 5GMM-REGISTERED.LIMITED-SERVICE.

 Otherwise, the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally, the UE may disable the N1 mode capability for the current PLMN or SNPN if each S-NSSAI in the default configured NSSAI was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9.

 If the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN and has rejected NSSAI for the reached maximum number of UEs, and the UE wants to obtain services in the current serving cell without performing a PLMN selection or SNPN selection, the UE may stay in the current serving cell and attempt to use the rejected S-NSSAI(s) for the maximum number of UEs reached in the current serving cell after rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU2 NOT UPDATED, reset the attach attempt counter and enter the state EMM-REGISTERED.

#72 (Non-3GPP access to 5GCN not allowed).

 When received over non-3GPP access the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter and enter the state 5GMM-DEREGISTERED. If the message has been successfully integrity checked by the NAS, the UE shall set:

1) the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for non-3GPP access for that SNPN in case of SNPN;

 to the UE implementation-specific maximum value.

NOTE 7: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

 The UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3).

 As an implementation option, the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

 If received over 3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.3.7.

#73 (Serving network not authorized).

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall delete the list of equivalent PLMNs, reset the registration attempt counter, store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A. For 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5], and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18]. If the message has been successfully integrity checked by the NAS, the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the tracking area updating attempt counter and enter the state EMM-DEREGISTERED.

#74 (Temporarily not authorized for this SNPN).

 5GMM cause #74 is only applicable when received from a cell belonging to an SNPN. 5GMM cause #74 received from a cell not belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and store the SNPN identity in the "temporarily forbidden SNPNs" list for the specific access type for which the message was received and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the UE is not registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]. If the UE is registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

NOTE 8: When 5GMM cause #74 is received over 3GPP access, the term "other access" in "the UE also supports the registration procedure over the other access to the same SNPN" is used to express access to SNPN services via a PLMN.

#75 (Permanently not authorized for this SNPN).

 5GMM cause #75 is only applicable when received from a cell belonging to an SNPN with a globally-unique SNPN identity. 5GMM cause #75 received from a cell not belonging to an SNPN or a cell belonging to an SNPN with a non-globally-unique SNPN identity is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and store the SNPN identity in the "permanently forbidden SNPNs" list for the specific access type for which the message was received and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the UE is not registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]. If the UE is registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

NOTE 9: When 5GMM cause #75 is received over 3GPP access, the term "other access" in "the UE also supports the registration procedure over the other access to the same SNPN" is used to express access to SNPN services via a PLMN.

#76 (Not authorized for this CAG or authorized for CAG cells only).

 This cause value received via non-3GPP access or from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7.

 The UE shall set the 5GS update status to 5U3.ROAMING NOT ALLOWED, store the 5GS update status according to clause 5.1.3.2.2, and reset the registration attempt counter.

 If 5GMM cause #76 is received from:

1) a CAG cell, and if the UE receives a "CAG information list" in the CAG information list IE included in the REGISTRATION REJECT message, the UE shall:

i) replace the "CAG information list" stored in the UE with the received CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 10: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

 Otherwise, the UE shall delete the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN. In the case the "allowed CAG list" for the current PLMN only contains a range of CAG-IDs, how the UE deletes the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN is up to UE implementation. In addition:

i) if the entry in the "CAG information list" for the current PLMN does not include an "indication that the UE is only allowed to access 5GS via CAG cells" or if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and the updated "allowed CAG list" for the current PLMN includes one or more CAG-IDs, then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list";

ii) if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and the updated "allowed CAG list" for the current PLMN does not include any CAG-ID, then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

iii) if the "CAG information list" does not include an entry for the current PLMN, then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list".

2) a non-CAG cell, and if the UE receives a "CAG information list" in the CAG information list IE included in the REGISTRATION REJECT message, the UE shall:

i) replace the "CAG information list" stored in the UE with the received CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 11: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

 Otherwise, the UE shall store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN, if any. If the "CAG information list" stored in the UE does not include the current PLMN's entry, the UE shall add an entry for the current PLMN to the "CAG information list" and store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN. If the UE does not have a stored "CAG information list", the UE shall create a new "CAG information list" and add an entry with an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN.

In addition:

i) if the "allowed CAG list" for the current PLMN includes one or more CAG-IDs, then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated CAG information; or

ii) if the "allowed CAG list" for the current PLMN does not include any CAG-ID, then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list".

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED, reset the attach attempt counter and enter the state EMM-REGISTERED.

#77 (Wireline access area not allowed).

 5GMM cause #77 is only applicable when received from a wireline access network by the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device). 5GMM cause #77 received from a 5G access network other than a wireline access network and 5GMM cause #77 received by the W-AGF acting on behalf of the FN-BRG are considered as abnormal cases and the behaviour of the UE is specified in subclause 5.5.1.3.7.

 When received over wireline access network, the 5G-RG and the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2), shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI, shall reset the registration attempt counter, shall enter the state 5GMM-DEREGISTERED and shall act as specified in subclause 5.3.23.

NOTE 12: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

#78 (PLMN not allowed to operate at the present UE location).

 This cause value received from a non-satellite NG-RAN cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall delete the list of equivalent PLMNs (if available) and reset the registration attempt counter. The UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5].

Editor's note: [5GSAT\_ARCH-CT, CR#3217]. It is FFS how to prevent the UE from making repeated attempts at selecting the same satellite access PLMN if there are no other available PLMNs at UE's location.

#79 (UAS services not allowed).

 The UE shall abort the registration procedure for mobility and periodic registration update procedure, set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE. Additionally, the UE shall reset the registration attempt counter. The UE shall not attempt the registration procedure with including the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE to the current PLMN until the UE is switched off or the UICC containing the USIM is removed. The UE may re-attempt the registration procedure without including the Service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of REGISTRATION REQUEST message to the current PLMN for services other than UAS services.

Other values are considered as abnormal cases. The behaviour of the UE in those cases is specified in subclause 5.5.1.3.7.

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

##### 5.5.2.3.2 Network-initiated de-registration procedure completion by the UE

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message indicates "re-registration required" and the de-registration request is for 3GPP access, the UE shall perform a local release of the PDU sessions over 3GPP access, if any. If there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs, the UE shall perform a local release of the user plane resources on 3GPP access. If there is an MA PDU session with user plane resources established on 3GPP access only, the UE shall perform a local release of the MA PDU session. The UE shall stop the timer(s) T3346, T3396, T3584, T3585 and 5GSM back-off timer(s) not related to congestion control (see subclause 6.2.12), if running. The UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for 3GPP access. Furthermore, the UE shall, after the completion of the de-registration procedure, and the release of the existing NAS signalling connection, initiate an initial registration. The UE should also re-establish any previously established PDU sessions over 3GPP access. For any previously established MA PDU sessions with user plane resources established on both accesses the UE should also re-establish the user plane resources over 3GPP access, and for any previously established MA PDU sessions with user plane resources established only on the 3GPP access the UE should re-establish the MA PDU session over 3GPP access.

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message indicates "re-registration required" and the de-registration request is for non-3GPP access, the UE shall perform a local release of the PDU sessions over non-3GPP access, if any. If there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs, the UE shall perform a local release of the user plane resources on non-3GPP access. If there is an MA PDU session with user plane resources established on non-3GPP access only, the UE shall perform a local release of the MA PDU session. The UE shall stop the timer(s) T3346, T3396, T3584 and T3585, if it is running. The UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for non-3GPP access. Furthermore, the UE shall, after the completion of the de-registration procedure, and the release of the existing NAS signalling connection, initiate an initial registration over non-3GPP. The UE should also re-establish any previously established PDU sessions over non-3GPP access. For any previously established MA PDU sessions with user plane resources established on both accesses the UE should also re-establish the user plane resources over non-3GPP access, and for any previously established MA PDU sessions with user plane resources established only on the non-3GPP access the UE should re-establish the MA PDU session over 3GPP access.

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message indicates "re-registration required" and the de-registration request is for both 3GPP access and non-3GPP access when the UE is registered in the same PLMN for both accesses, the UE shall perform a local release of the MA PDU sessions and PDU sessions over both 3GPP access and non-3GPP access, if any. The UE shall stop the timer(s) T3346, T3396, T3584 and T3585, if it is running. The UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for both 3GPP access and non-3GPP access. Furthermore, the UE shall, after the completion of the de-registration procedure, and the release of the existing NAS signalling connection, initiate an initial registration over both 3GPP access and non-3GPP access. The UE should also re-establish any previously established PDU sessions over both 3GPP access and non-3GPP access. For any previously established MA PDU sessions the UE should also re-establish the the MA PDU session and the user plane resources which were established previously.

NOTE 1: When the de-registration type indicates "re-registration required", user interaction is necessary in some cases when the UE cannot re-establish the PDU session (s), if any, automatically.

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message indicates "re-registration not required" and the de-registration request is for 3GPP access, the UE shall perform a local release of the PDU sessions over 3GPP access, if any. If there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs, the UE shall perform a local release of the user plane resources on 3GPP access. If there is an MA PDU session with user plane resources established on 3GPP access only, the UE shall perform a local release of the MA PDU session. The UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for 3GPP access.

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message indicates "re-registration not required" and the de-registration request is for non-3GPP access, the UE shall perform a local release of the PDU sessions over non-3GPP access, if any. If there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs, the UE shall perform a local release of the user plane resources on non-3GPP access. If there is an MA PDU session with user plane resources established on non-3GPP access only, the UE shall perform a local release of the MA PDU session. The UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for non-3GPP access.

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message indicates "re-registration not required" and the de-registration request is for both 3GPP access and non-3GPP access when the UE is registered in the same PLMN for both accesses, the UE shall perform a local release of the MA PDU sessions and PDU sessions over both 3GPP access and non-3GPP access, if any. The UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for both 3GPP access and non-3GPP access.

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message includes the rejected NSSAI, the UE takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

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

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

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as described in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

"S-NSSAI not available due to maximum number of UEs reached"

 The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

 If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then the UE shall for each S-NSSAI behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running; and

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

Upon sending a DEREGISTRATION ACCEPT message, the UE shall delete the rejected NSSAI as specified in subclause 4.6.2.2.

If the de-registration type indicates "re-registration required", then the UE shall ignore the 5GMM cause IE if received.

If the de-registration type indicates "re-registration not required", the UE shall take the actions depending on the received 5GMM cause value:

#3 (Illegal UE);

#6 (Illegal ME)

 The message was received via 3GPP access and the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

- In case of PLMN, the UE shall consider the USIM as invalid for 5GS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.1;

 In case of SNPN, if the UE does not support access to an SNPN using credentials from a credentials holder, the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. In case of SNPN, if the UE supports access to an SNPN using credentials from a credentials holder, the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. Additionally, if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN, the UE shall consider the USIM as invalid for the current SNPN until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.2.

 The UE shall delete the list of equivalent PLMNs (if any) and shall enter the state 5GMM-DEREGISTERED.NO-SUPI.

 The UE shall delete the 5GMM parameters stored in non-volatile memory of the ME as specified in annex C.

 If the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required". The USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a in 3GPP TS 24.301 [15].

 If the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#7 (5GS services not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

 In case of PLMN, the UE shall consider the USIM as invalid for 5GS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.1;

 In case of SNPN, if the UE does not support access to an SNPN using credentials from a credentials holder, the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 5GS services until the UE is switched off, or the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. In case of SNPN, if the UE supports access to an SNPN using credentials from a credentials holder, the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. Additionally, if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN, the UE shall consider the USIM as invalid for the current SNPN until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.2.

 The UE shall enter the state 5GMM-DEREGISTERED.NO-SUPI.

 The UE shall delete the 5GMM parameters stored in non-volatile memory of the ME as specified in annex C.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required".

 If the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#11 (PLMN not allowed).

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall delete the list of equivalent PLMNs, shall reset the registration attempt counter. For 3GPP access the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH, and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE.

 The UE shall store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in clause 5.3.19a.1.

 For 3GPP access the UE shall perform a PLMN selection according to 3GPP TS 23.122 [5], and for non-3GPP access the UE shall perform network selection as defined in 3GPP TS 24.502 [18].

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required".

 If the UE also supports the registration procedure over the other access to the same PLMN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#12 (Tracking area not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE.

 If the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service". Otherwise, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters, EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required".

#13 (Roaming not allowed in this tracking area).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall delete the list of equivalent PLMNs (if available), reset the registration attempt counter. For 3GPP access the UE shall change to state 5GMM-DEREGISTERED.PLMN-SEARCH, and for non-3GPP access the UE shall change to state 5GMM-DEREGISTERED.LIMITED-SERVICE.

 If the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming". Otherwise, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription.

 For 3GPP access the UE shall perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5], and for non-3GPP access the UE shall perform network selection as defined in 3GPP TS 24.502 [18].

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required".

#15 (No suitable cells in tracking area).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE.

 If the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming". Otherwise the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription.

 The UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C].

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required".

 If received over non-3GPP access and de-registration request is for non-3GPP access only, the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.2.3.4.

#22 (Congestion).

 If the T3346 value IE is present in the DEREGISTRATION REQUEST message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below, otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.2.3.4.

 The UE shall stop timer T3346 if it is running, set the 5GS update status to 5U2 NOT UPDATED, reset the registration attempt counter and enter the state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION.

 The UE shall start timer T3346 with the value provided in the T3346 value IE.

 If the message was received via 3GPP access and the UE is operating in the single-registration mode, the UE shall set the EPS update status to EU2 NOT UPDATED, reset the attach attempt counter and shall enter the state EMM-DEREGISTERED.

#27 (N1 mode not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter and shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE.

 The UE shall disable the N1 mode capability for both 3GPP access and non-3GPP access (see subclause 4.9).

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the attach attempt counter and enter the state EMM-DEREGISTERED.

#62 (No network slices available).

 The UE shall set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.NORMAL-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH. Additionally, the UE shall reset the registration attempt counter.

 The UE receiving the rejected NSSAI in the DEREGISTRATION REQUEST message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

 "S-NSSAI not available in the current PLMN or SNPN"

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN until switching off the UE, the UICC containing the USIM is removed, an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

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

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as described in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

 "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

 The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

 If the UE has an allowed NSSAI or configured NSSAI that contains S-NSSAI(s) which are not included any of the rejected NSSAI for the current PLMN or SNPN, the rejected NSSAI for the current registration area, the rejected NSSAI for the failed or revoked NSSAA, and rejected NSSAI for the maximum number of UEs reached, the UE may stay in the current serving cell, apply the normal cell reselection process and start an initial registration with a requested NSSAI that includes any S-NSSAI from the allowed NSSAI or the configured NSSAI that is neither in the rejected NSSAI for the PLMN or SNPN nor in the rejected NSSAI for the current registration area nor in the rejected NSSAI for the failed or revoked NSSAA nor rejected NSSAI for the maximum number of UEs reached. Otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally, the UE may disable the N1 mode capability for the current PLMN or SNPN if the UE does not have an allowed NSSAI and each S-NSSAI in configured NSSAI, if available, was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" or "S-NSSAI not available due to maximum number of UEs reached" as described in subclause 4.9.

 If the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN and has a default configured NSSAI containing one or more S-NSSAIs that are not included in any of the rejected NSSAI for the PLMN or SNPN, the rejected NSSAI for the current registration area, the rejected NSSAI for the failed or revoked NSSAA, and rejected NSSAI for the maximum number of UEs reached,

1) the UE may stay in the current serving cell, apply the normal cell reselection process, and start an initial registration with a requested NSSAI with that default configured NSSAI; or

2) if all the S-NSSAI(s) in the default configured NSSAI are rejected and at least one S-NSSAI is rejected due to "S-NSSAI not available in the current registration area",

i) if the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; or

ii) if the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE.

 Otherwise, the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally, the UE may disable the N1 mode capability for the current PLMN or SNPN if each S-NSSAI in the default configured NSSAI was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9.

 If the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN and has rejected NSSAI for the reached maximum number of UEs, and the UE wants to obtain services in the current serving cell without performing a PLMN selection or SNPN selection, the UE may stay in the current serving cell and attempt to use the rejected S-NSSAI(s) for the maximum number of UEs reached in the current serving cell after the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU2 NOT UPDATED, reset the attach attempt counter and enter the state EMM-DEREGISTERED.

#72 (Non-3GPP access to 5GCN not allowed).

 If received over non-3GPP access when the UE is registered over non-3GPP access, or received over 3GPP access and de-registration request is for non-3GPP access when the UE is registered in the same PLMN for both accesses, the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI for non-3GPP access. Additionally, the UE shall reset the registration attempt counter and enter the state 5GMM-DEREGISTERED for non-3GPP access.

NOTE 2: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

 The UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3).

 As an implementation option, if the UE is not currently registered over 3GPP access, the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

 If received over 3GPP access and de-registration request is for 3GPP access only, the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.2.3.4.

#74 (Temporarily not authorized for this SNPN).

 5GMM cause #74 is only applicable when received from a cell belonging to an SNPN. 5GMM cause #74 received from a cell not belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and shall store the SNPN identity in the "temporarily forbidden SNPNs" list for the specific access type for which the message was received and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the UE is not registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]. If the UE is registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection for onboarding services according to 3GPP TS 23.122 [5].

#75 (Permanently not authorized for this SNPN).

 5GMM cause #75 is only applicable when received from a cell belonging to an SNPN with a globally-unique SNPN identity. 5GMM cause #75 received from a cell not belonging to an SNPN or a cell belonging to an SNPN with a non-globally-unique SNPN identity is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and store the SNPN identity in the "permanently forbidden SNPNs" list for the specific access type for which the message was received and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. The UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5].

#76 (Not authorized for this CAG or authorized for CAG cells only).

 This cause value received via non-3GPP access or from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4.

 The UE shall set the 5GS update status to 5U3.ROAMING NOT ALLOWED, store the 5GS update status according to clause 5.1.3.2.2, and reset the registration attempt counter.

 If 5GMM cause #76 is received from:

1) a CAG cell, and if the UE receives a "CAG information list" in the CAG information list IE included in the DEREGISTRATION REQUEST message, the UE shall:

i) replace the "CAG information list" stored in the UE with the received CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 3: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

 Otherwise, the UE shall delete the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN. In the case the "allowed CAG list" for the current PLMN only contains a range of CAG-IDs, how the UE deletes the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN is up to UE implementation. In addition:

i) if the entry in the "CAG information list" for the current PLMN does not include an "indication that the UE is only allowed to access 5GS via CAG cells" or if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and the updated "allowed CAG list" for the current PLMN includes one or more CAG-IDs, then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"; or

ii) if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and the updated "allowed CAG list" for the current PLMN does not include any CAG-ID, then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list".

2) a non-CAG cell, and if the UE receives a "CAG information list" in the CAG information list IE included in the DEREGISTRATION REQUEST message, the UE shall:

i) replace the "CAG information list" stored in the UE with the received CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 4: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

 Otherwise, the UE shall store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN, if any. If the "CAG information list" stored in the UE does not include the current PLMN's entry, the UE shall add an entry for the current PLMN to the "CAG information list" and store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN. If the UE does not have a stored "CAG information list", the UE shall create a new "CAG information list" and add an entry with an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN.

In addition:

i) if the "allowed CAG list" for the current PLMN includes one or more CAG-IDs, then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated CAG information; or

ii) if the "allowed CAG list" for the current PLMN does not include any CAG-ID, then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list".

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED, reset the attach attempt counter and enter the state EMM-DEREGISTERED.

#77 (Wireline access area not allowed).

 5GMM cause #77 is only applicable when received from a wireline access network by the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device). 5GMM cause #77 received from a 5G access network other than a wireline access network and 5GMM cause #77 received by the W-AGF acting on behalf of the FN-BRG are considered as abnormal cases and the behaviour of the UE is specified in subclause 5.5.2.3.4.

 When received over wireline access network, the 5G-RG and the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2), shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI, shall reset the registration attempt counter, shall enter the state 5GMM-DEREGISTERED and shall act as specified in subclause 5.3.23.

NOTE 5: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

#78 (PLMN not allowed to operate at the present UE location).

 This cause value received from a non-satellite NG-RAN cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall delete the list of equivalent PLMNs (if available) and reset the registration attempt counter. The UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5].

Editor's note: [5GSAT\_ARCH-CT, CR#3217]. It is FFS how to prevent the UE from making repeated attempts at selecting the same satellite access PLMN if there are no other available PLMNs at UE's location.

#79 (UAS services not allowed).

- A UE which is not a UE supporting UAS services receiving this cause value shall considered it as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4.

 A UE supporting UAS service shall set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.NORMAL-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH. Additionally, the UE shall reset the registration attempt counter. The UE shall not attempt to register for UAS services to the current PLMN until the UE is switched off or the UICC containing the USIM is removed.

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

#### 5.6.1.5 Service request procedure not accepted by the network

If the service request cannot be accepted, the network shall return a SERVICE REJECT message to the UE including an appropriate 5GMM cause value.

If the SERVICE REJECT message with 5GMM cause #76 or #78 was received without integrity protection, then the UE shall discard the message.

If the AMF needs to initiate PDU session status synchronisation or a PDU session status IE was included in the SERVICE REQUEST message, the AMF shall include a PDU session status IE in the SERVICE REJECT message to indicate which PDU sessions associated with the access type the SERVICE REJECT message is sent over are active in the AMF. If the PDU session status IE is included in the SERVICE REJECT message and if the message is integrity protected, then:

a) for single access PDU sessions, the UE shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING on the UE side associated with the access type the SERVICE REJECT message is sent over, but are indicated by the AMF as being in 5GSM state PDU SESSION INACTIVE; and

b) for MA PDU sessions, for all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING and have user plane resources established on the UE side associated with the access the SERVICE REJECT message is sent over, but are indicated by the AMF as no user plane resources established:

1) for MA PDU sessions having user plane resources established only on the access type the SERVICE REJECT message is sent over, the UE shall perform a local release of those MA PDU sessions; and

2) for MA PDU sessions having user plane resources established on both accesses, the UE shall perform a local release on the user plane resources on the access type the SERVICE REJECT message is sent over.

If the service request for mobile originated services is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

In NB-N1 mode, if the service request for mobile originated services is rejected due to operator determined barring (see 3GPP TS 29.503 [20AB]), the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

If the service request from a UE supporting CAG is rejected due to CAG restrictions, the network shall set the 5GMM cause value to #76 "Not authorized for this CAG or authorized for CAG cells only" and should include the "CAG information list" in the CAG information list IE in the SERVICE REJECT message.

NOTE 1: The network cannot be certain that "CAG information list" stored in the UE is updated as result of sending of the SERVICE REJECT message with the CAG information list IE, as the SERVICE REJECT message is not necessarily delivered to the UE (e.g., due to abnormal radio conditions).

NOTE 2: The "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription.

If the service request from a UE not supporting CAG is rejected due to CAG restrictions, the network shall operate as described in bullet h) of subclause 5.6.1.8.

Upon receipt of the CONTROL PLANE SERVICE REQUEST message with uplink data:

- if the AMF decides to not forward the uplink data piggybacked in the CONTROL PLANE SERVICE REQUEST message; and

- if the AMF decides to activate the congestion control for transport of user data via the control plane,

then the AMF shall send a SERVICE REJECT message and set the 5GMM cause value to #22 "congestion" and assign a value for control plane data back-off timer T3448.

If the AMF determines that the UE is in a non-allowed area or is not in an allowed area as specified in subclause 5.3.5, then:

a) if the service type IE in the SERVICE REQUEST message is set to "signalling" or "data", the AMF shall send a SERVICE REJECT message with the 5GMM cause value set to #28 "Restricted service area";

b) otherwise, if the service type IE in the SERVICE REQUEST message is set to "mobile terminated services", "emergency services", "emergency services fallback", "high priority access" or "elevated signalling", the AMF shall continue the process as specified in subclause 5.6.1.4 unless for other reasons the service request cannot be accepted.

If the service request for mobile originated services is rejected due to service gap control as specified in subclause 5.3.17, i.e. the T3447 timer is running in AMF, the network shall set the 5GMM cause value to #22 "Congestion" and may include T3346 value IE in the SERVICE REJECT message set to the remaining time of the running T3447 timer.

Based on operator policy, if the service request procedure is rejected due to core network redirection for CIoT optimizations, the network shall set the 5GMM cause value to #31 "Redirection to EPC required".

NOTE 3: The network can take into account the UE's S1 mode capability, the EPS CIoT network behaviour supported by the UE or the EPS CIoT network behaviour supported by the EPC to determine the rejection with the 5GMM cause value #31 "Redirection to EPC required".

If the service request is via a satellite NG-RAN cell, and the network determines that the UE is in a location where the network is not allowed to operate, see 3GPP TS 23.502 [9], the network shall set the 5GMM cause value in the SERVICE REJECT message to #78 "PLMN not allowed to operate at the present UE location" and may include an information element in the SERVICE REJECT message to indicate the country of the UE location.

Editor's note: [5GSAT\_ARCH-CT, CR#3217]. The name and the encoding of the information element providing the country of the UE location is FFS

On receipt of the SERVICE REJECT message, if the UE is in state 5GMM-SERVICE-REQUEST-INITIATED, the UE shall reset the service request attempt counter and stop timer T3517 if running.

The UE shall take the following actions depending on the 5GMM cause value received in the SERVICE REJECT message.

#3 (Illegal UE);

#6 (Illegal ME);

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

 In case of PLMN, the UE shall consider the USIM as invalid for 5GS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.1;

 In case of SNPN, if the UE does not support access to an SNPN using credentials from a credentials holder, the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. In case of SNPN, if the UE supports access to an SNPN using credentials from a credentials holder, the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. Additionally, if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN, the UE shall consider the USIM as invalid for the current SNPN until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.2.

 The UE shall delete the list of equivalent PLMNs (if any) and shall enter the state 5GMM-DEREGISTERED.NO-SUPI. If the message has been successfully integrity checked by the NAS, then the UE shall:

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN if the UE maintains these counters;

 to UE implementation-specific maximum value.

3) delete the 5GMM parameters stored in non-volatile memory of the ME as specified in annex C.

 If the message was received via 3GPP access and the UE is operating in the single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value. The USIM shall be considered as invalid also for non-EPS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a in 3GPP TS 24.301 [15]. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#7 (5GS services not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

 In case of PLMN, the UE shall consider the USIM as invalid for 5GS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.1;

 In case of SNPN, if the UE does not support access to an SNPN using credentials from a credentials holder, the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 5GS services until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. In case of SNPN, if the UE supports access to an SNPN using credentials from a credentials holder, the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. Additionally, if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN, the UE shall consider the USIM as invalid for the current SNPN until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.2.

 The UE shall enter the state 5GMM-DEREGISTERED.NO-SUPI. If the message has been successfully integrity checked by the NAS, then the UE shall:

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN if the UE maintains these counters;

 to UE implementation-specific maximum value.

3) delete the 5GMM parameters stored in non-volatile memory of the ME as specified in annex C.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

NOTE 4: The possibility to configure a UE so that the radio transceiver for a specific radio access technology is not active, although it is implemented in the UE, is outside the scope of the present document.

#9 (UE identity cannot be derived by the network).

 The UE shall set the 5GS update status to 5U2 NOT UPDATED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall enter the state 5GMM-DEREGISTERED.

 If the service request was initiated for emergency services fallback, the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6]. If the UE finds a suitable E-UTRA cell, it then proceeds with the appropriate EMM or 5GMM procedures. If the UE operating in single-registration mode has changed to S1 mode, it shall disable the N1 mode capability for 3GPP access.

 If the service request was initiated for any reason other than emergency services fallback or initiating an emergency PDU session, the UE shall perform a new initial registration procedure.

NOTE 5: User interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically.

 If the message was received via 3GPP access and the UE is operating in the single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value.

#10 (Implicitly de-registered).

 The UE shall enter the state 5GMM-DEREGISTERED.NORMAL-SERVICE. The UE shall delete any mapped 5G NAS security context or partial native 5G NAS security context.

 If the service request was initiated for emergency services fallback, the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6]. If the UE finds a suitable E-UTRA cell, it then proceeds with the appropriate EMM or 5GMM procedures. If the UE operating in single-registration mode has changed to S1 mode, it shall disable the N1 mode capability for 3GPP access.

 If the rejected request was neither for initiating an emergency PDU session nor for emergency services fallback, the UE shall perform a new initial registration procedure.

NOTE 6: User interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically.

 If the message was received via 3GPP access and the UE is operating in the single-registration mode, the UE shall handle the EMM state as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value.

#11 (PLMN not allowed).

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall delete the list of equivalent PLMNs and store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in clause 5.3.19a.1. For 3GPP access, the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5], and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18]. If the message has been successfully integrity checked by the NAS and the UE mantains the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN, the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same PLMN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

#12 (Tracking area not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

 If:

1) the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. If the SERVICE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. If the SERVICE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, for non-integrity protected NAS reject message.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value.

#13 (Roaming not allowed in this tracking area).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2). For 3GPP access the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH, and for non-3GPP access the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE.

 If:

1) the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and remove the current TAI from the stored TAI list if present. If the SERVICE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, and remove the current TAI from the stored TAI list if present. If the SERVICE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, for non-integrity protected NAS reject message.

 For 3GPP access the UE shall perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5], and for non-3GPP access the UE shall perform network selection as defined in 3GPP TS 24.502 [18].

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state and EPS update status as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value.

#15 (No suitable cells in tracking area).

 The UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE.

 If:

1) the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and remove the current TAI from the stored TAI list if present. If the SERVICE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, and remove the current TAI from the stored TAI list if present. If the SERVICE REJECT message is not integrity protected, the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription, for non-integrity protected NAS reject message.

 If the UE initiated service request for emergency services fallback, the UE shall attempt to select an E-UTRA cell connected to EPC or 5GC according to the emergency services support indicator (see 3GPP TS 36.331 [25A]). If the UE finds a suitable E-UTRA cell, it then proceeds with the appropriate EMM or 5GMM procedures. If the UE operating in single-registration mode has changed to S1 mode, it shall disable the N1 mode capability for 3GPP access.

 If the service request was not initiated for emergency services fallback, the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C].

 If the message was received via 3GPP access and the UE is operating in the single-registration mode, the UE shall handle the EMM parameters EMM state and EPS update status as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value.

 If received over non-3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.6.1.7.

#22 (Congestion).

 If the T3346 value IE is present in the SERVICE REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below, otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.6.1.7.

 If the rejected request was not for initiating an emergency PDU session, the UE shall abort the service request procedure and enter state 5GMM-REGISTERED and stop timer T3517 if still running.

 The UE shall stop timer T3346 if it is running.

 If the SERVICE REJECT message is integrity protected, the UE shall start timer T3346 with the value provided in the T3346 value IE.

 If the SERVICE REJECT message is not integrity protected, the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [12].

 For all other cases the UE stays in the current serving cell and applies normal cell reselection process. The service request procedure is started, if still necessary, when timer T3346 expires or is stopped.

 If the message was received via 3GPP access and the UE is operating in the single-registration mode, the UE shall handle the EMM parameters EMM state and EPS update status as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value.

 If the service request procedure was initiated for an MO MMTEL voice call (i.e. access category 4), or for an MO MMTEL video call (i.e. access category 5) or for an MO IMS registration related signalling (i.e. access category 9), a notification that the service request was not accepted due to congestion shall be provided to the upper layers.

 If the UE is using 5GS services with control plane CIoT 5GS optimization and if the T3448 value IE is present in the SERVICE REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall:

a) stop timer T3448 if it is running;

b) consider the transport of user data via the control plane as unsuccessful; and

c) start timer T3448:

1) with the value provided in the T3448 value IE if the SERVICE REJECT message is integrity protected; or

2) with a random value from the default range specified in 3GPP TS 24.301 [15] table 10.2.1 if the SERVICE REJECT message is not integrity protected.

 If the UE is using 5GS services with control plane CIoT 5GS optimization, the T3448 value IE is present in the SERVICE REJECT message and the value indicates that this timer is either zero or deactivated, the UE shall ignore the T3448 value IE and:

a) stop timer T3448 if it is running; and

b) consider the transport of user data via the control plane as unsuccessful.

 If the UE is using 5GS services with control plane CIoT 5GS optimization and if the T3448 value IE is not present in the SERVICE REJECT message, it shall be considered as an abnormal case and the behaviour of UE for this case is specified in subclause 5.6.1.7.

#27 (N1 mode not allowed).

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE. If the message has been successfully integrity checked by the NAS, the UE shall set:

1) the PLMN-specific N1 mode attempt counter for 3GPP access and the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for 3GPP access for the current SNPN and the SNPN-specific attempt counter for non-3GPP access for the current SNPN in case of SNPN

 to the UE implementation-specific maximum value.

 The UE shall disable the N1 mode capability for the specific access type for which the message was received (see subclause 4.9).

 If the message has been successfully integrity checked by the NAS, the UE shall disable the N1 mode capability also for the other access type (see subclause 4.9).

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and enter the state EMM-REGISTERED.

#28 (Restricted service area).

 The UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE, wait for the release of the N1 NAS signalling connection and perform the registration procedure for mobility and periodic registration update if the service type IE in the SERVICE REQUEST message was not set to "elevated signalling" and the SERVICE REJECT message is received over 3GPP access (see subclause 5.3.5 and 5.5.1.3).

 If the service type IE in the SERVICE REQUEST message was set to "elevated signalling", the UE shall not re-initiate service request procedure until the UE enters an allowed area or leaves a non-allowed area, except for emergency services, high priority access or responding to paging or notification.

#31 (Redirection to EPC required).

 5GMM cause #31 received by a UE that has not indicated support for CIoT optimizations or received by a UE over non-3GPP access is considered an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7.

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2). The UE shall reset the service request attempt counter and enter the state 5GMM-REGISTERED.LIMITED-SERVICE.

 The UE shall enable the E-UTRA capability if it was disabled and disable the N1 mode capability for 3GPP access (see subclause 4.9.2).

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters, EMM state, and EPS update status as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value.

#72 (Non-3GPP access to 5GCN not allowed).

 If the UE initiated the service request procedure over non-3GPP access, the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI for non-3GPP access. Additionally, the UE shall enter the state 5GMM-DEREGISTERED for non-3GPP access. If the message has been successfully integrity checked by the NAS, the UE shall set:

1) the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for non-3GPP access for that SNPN in case of SNPN;

 to the UE implementation-specific maximum value.

NOTE 7: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

 The UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3).

 As an implementation option, if the UE is not currently registered over 3GPP access, the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

 If received over 3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.6.1.7.

#73 (Serving network not authorized).

 This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall delete the list of equivalent PLMNs, store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A. For 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5], and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE in order to perform network selection as defined in 3GPP TS 24.502 [18]. If the message has been successfully integrity checked by the NAS, the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value.

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED, enter the state EMM-DEREGISTERED and shall delete any 4G-GUTI, last visited registered TAI, TAI list and eKSI.

#74 (Temporarily not authorized for this SNPN).

 5GMM cause #74 is only applicable when received from a cell belonging to an SNPN. 5GMM cause #74 received from a cell not belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list for the specific access type for which the message was received and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the UE is not registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]. If the UE is registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

NOTE 8: When 5GMM cause #74 is received over 3GPP access, the term "other access" in "the UE also supports the registration procedure over the other access to the same SNPN" is used to express access to SNPN services via a PLMN.

#75 (Permanently not authorized for this SNPN).

 5GMM cause #75 is only applicable when received from a cell belonging to an SNPN with a globally-unique SNPN identity. 5GMM cause #75 received from a cell not belonging to an SNPN or a cell belonging to an SNPN with a non-globally-unique SNPN identity is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall store the SNPN identity in the "permanently forbidden SNPNs" list for the specific access type for which the message was received and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the UE is not registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]. If the UE is registered for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value.

 If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

NOTE 9: When 5GMM cause #75 is received over 3GPP access, the term "other access" in "the UE also supports the registration procedure over the other access to the same SNPN" is used to express access to SNPN services via a PLMN.

#76 (Not authorized for this CAG or authorized for CAG cells only).

 This cause value received via non-3GPP access or from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7.

 The UE shall set the 5GS update status to 5U3.ROAMING NOT ALLOWED, store the 5GS update status according to clause 5.1.3.2.2.

 If 5GMM cause #76 is received from:

1) a CAG cell, and if the UE receives a "CAG information list" in the CAG information list IE included in the SERVICE REJECT message, the UE shall:

i) replace the "CAG information list" stored in the UE with the received "CAG information list" when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 10: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

 Otherwise, the UE shall delete the CAG-ID from the "allowed CAG list" for the current PLMN. In the case the "allowed CAG list" for the current PLMN only contains a range of CAG-IDs, how the UE deletes the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN is up to UE implementation. In addition:

i) if the entry in the "CAG information list" for the current PLMN does not include an "indication that the UE is only allowed to access 5GS via CAG cells" or if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and the updated "allowed CAG list" for the current PLMN includes one or more CAG-IDs, then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list";

ii) if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and the updated "allowed CAG list" for the current PLMN does not include any CAG-ID, then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

iii) if the "CAG information list" does not include an entry for the current PLMN, then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list".

2) a non-CAG cell, and if the UE receives a "CAG information list" in the CAG information list IE included in the SERVICE REJECT message, the UE shall:

i) replace the "CAG information list" stored in the UE with the received "CAG information list" when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 11: When the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN, entries of a PLMN other than the serving VPLMN, if any, in the received CAG information list IE are ignored.

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE does not contain the serving VPLMN's entry.

 Otherwise, the UE shall store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN, if any. If the "CAG information list" stored in the UE does not include the current PLMN's entry, the UE shall add an entry for the current PLMN to the "CAG information list" and store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN. If the UE does not have a stored "CAG information list", the UE shall create a new "CAG information list" and add an entry with an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN.

In addition:

i) if the "allowed CAG list" for the current PLMN includes one or more CAG-IDs, then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated CAG information; or

ii) if the "allowed CAG list" for the current PLMN does not include any CAG-ID, then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list".

 If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED, reset the attach attempt counter and enter the state EMM-REGISTERED.

#77 (Wireline access area not allowed).

 5GMM cause #77 is only applicable when received from a wireline access network by the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device). 5GMM cause #77 received from a 5G access network other than a wireline access network and 5GMM cause #77 received by the W-AGF acting on behalf of the FN-BRG are considered as abnormal cases and the behaviour of the UE is specified in subclause 5.6.1.7.

 When received over wireline access network, the 5G-RG and the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2), shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI, shall enter the state 5GMM-DEREGISTERED and shall act as specified in subclause 5.3.23.

NOTE 12: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

#78 (PLMN not allowed to operate at the present UE location).

 This cause value received from a non-satellite NG-RAN cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7.

 The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall delete the list of equivalent PLMNs (if available) and reset the registration attempt counter. The UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5].

Editor's note: [5GSAT\_ARCH-CT, CR#3217]. It is FFS how to prevent the UE from making repeated attempts at selecting the same satellite access PLMN if there are no other available PLMNs at UE's location.

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

### 6.2.16 Handling of header compression for control plane CIoT optimizations

The UE and the SMF may use:

- IP header compression for PDU sessions of "IPv4", "IPv6" or "IPv4v6" PDU session type; and

- Ethernet header compression for PDU sessions of "Ethernet" PDU session type.

Both the UE and the AMF indicate whether header compression for control plane CIoT 5GS optimization is supported during registration procedures (see subclause 5.5.1). If both the UE and the network support header compression, the header compression configuration for each PDU session is negotiated during the PDU session establishment procedure and PDU session modification procedure as specified in subclauses 6.3.2, 6.4.1 and 6.4.2.

For IP header compression, ROHC protocol specified in IETF RFC 5795 [39B] is used. The IP header compression configuration used for IP header compression is (re-)negotiated between the UE and the SMF using the IP header compression configuration IE as specified in subclauses 6.3.2.2, 6.4.1.2, 6.4.1.3 and 6.4.2.2, respectively.

For Ethernet header compression, Ethernet Header Compression (EHC) protocol specified in 3GPP TS 38.323 [29] is used. The Ethernet header compression configuration used for Ethernet header compression is (re-)negotiated between the UE and the SMF using the Ethernet header compression configuration IE as specified in subclauses 6.3.2.2, 6.4.1.2, 6.4.1.3 and 6.4.2.2, respectively.

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

#### 9.11.4.20 Serving PLMN rate control

See subclause 9.9.4.28 in 3GPP TS 24.301 [15].

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

#### 9.11.4.28 Ethernet header compression configuration

The purpose of the Ethernet header compression configuration information element is to negotiate the use of EHC and the length of the CID field in the EHC packet (see 3GPP TS 38.323 [29]).

The Ethernet header compression configuration information element is coded as shown in figure 9.11.4.28.1 and table 9.11.4.28.1.

The Ethernet header compression configuration is a type 4 information element with the length of 3 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Ethernet header compression configuration IEI | octet 1 |
| Length of Ethernet header compression configuration contents | octet 2 |
| 0Spare | 0Spare | 0Spare | 0Spare | 0Spare | 0Spare | CID Length | octet 3 |

Figure 9.11.4.28.1: Ethernet header compression configuration information element

Table 9.11.4.28.1: Ethernet header compression configuration information element

|  |
| --- |
| Length of CID field value (CID Length) (octet 3 bits 1 and 2) |
|  |
| Bit |
| 2 | **1** |  |
| 0 | 0 | Ethernet header compression not used |
| 0 | 1 | 7 bits |
| 1 | 0 | 15 bits |
|  |
| All other values shall be interpreted as "7 bits".Bits 3 to 8 of octet 3 are spare and shall be coded as zero. |

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

## C.1 Storage of 5GMM information for UEs not operating in SNPN access operation mode

The following 5GMM parameters shall be stored on the USIM if the corresponding file is present:

a) 5G-GUTI;

b) last visited registered TAI;

c) 5GS update status;

d) 5G NAS security context parameters from a full native 5G NAS security context (see 3GPP TS 33.501 [24]);

e) KAUSF and KSEAF (see 3GPP TS 33.501 [24]);

f) SOR counter (see subclause 9.11.3.51);

g) SOR-CMCI; and

h) UE parameter update counter (see subclause 9.11.3.53A);

The UE may support multiple records of NAS security context storage for multiple registration (see 3GPP TS 31.102 [22]). If the UE supports multiple records of NAS security context storage for multiple registration, the first 5G security context of one access shall be stored in record 1 of the 5G NAS Security Context USIM file for that access and the second 5G security context of that access shall be stored in record 2 of the same file. The presence and format of corresponding files on the USIM is specified in 3GPP TS 31.102 [22].

If the corresponding file is not present on the USIM, these 5GMM parameters are stored in a non-volatile memory in the ME together with the SUPI from the USIM. These 5GMM parameters can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory; else the UE shall delete the 5GMM parameters.

The following 5GMM parameters shall be stored in a non-volatile memory in the ME together with the SUPI from the USIM:

- configured NSSAI(s);

- NSSAI inclusion mode(s);

- MPS indicator;

- MCS indicator;

- operator-defined access category definitions;

- network-assigned UE radio capability IDs;

- "CAG information list", if the UE supports CAG;

- signalled URSP (see 3GPP TS 24.526 [19]); and

- SOR-CMCI.

Each configured NSSAI consists of S-NSSAI(s) stored together with a PLMN identity, if it is associated with a PLMN. The UE shall store the S-NSSAI(s) of the HPLMN. If the UE is in the VPLMN, the UE shall also store the configured NSSAI for the current PLMN and any necessary mapped S-NSSAI(s). The configured NSSAI(s) can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the configured NSSAI(s).

Each NSSAI inclusion mode is associated with a PLMN identity and access type. The NSSAI inclusion mode(s) can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the NSSAI inclusion mode(s).

The MPS indicator is stored together with a PLMN identity of the PLMN that provided it, and is valid in that RPLMN or equivalent PLMN. The MPS indicator can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME, else the UE shall delete the MPS indicator.

The MCS indicator is stored together with a PLMN identity of the PLMN that provided it, and is valid in that RPLMN or equivalent PLMN. The MCS indicator can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME, else the UE shall delete the MCS indicator.

Operator-defined access category definitions are stored together with a PLMN identity of the PLMN that provided them, and is valid in that PLMN or equivalent PLMN. The operator-defined access category definitions can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME, else the UE shall delete the operator-defined access category definitions. The maximum number of stored operator-defined access category definitions is UE implementation dependent.

Each network-assigned UE radio capability ID is stored together with a PLMN identity of the PLMN that provided it as well as a mapping to the corresponding UE radio configuration, and is valid in that PLMN. A network-assigned UE radio capability ID can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME, else the UE shall delete the network-assigned UE radio capability ID. The UE shall be able to store at least the last 16 received network-assigned UE radio capability IDs. There shall be only one network-assigned UE radio capability ID stored for a given combination of PLMN identity and UE radio configuration and any existing UE radio capability ID shall be deleted when a new UE radio capability ID is added for the same combination of PLMN identity and UE radio configuration. If the UE receives a network-assigned UE radio capability ID with a Version ID value different from the value included in the network-assigned UE radio capability ID(s) stored at the UE for the serving PLMN, the UE may delete these stored network-assigned UE radio capability ID(s).

The allowed NSSAI(s) can be stored in a non-volatile memory in the ME together with the SUPI from the USIM. Allowed NSSAI consists of S-NSSAI(s) stored together with a PLMN identity, if it is associated with a PLMN. If the allowed NSSAI is stored, then the UE shall store the S-NSSAI(s) of the HPLMN. If the UE is in the VPLMN, the UE shall also store the allowed NSSAI for the serving PLMN and any necessary mapping of the allowed NSSAI for the serving PLMN to the S-NSSAI(s) of the HPLMN. The allowed NSSAI(s) can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the allowed NSSAI(s).

If the UE is registered for emergency services, the UE shall not store the 5GMM parameters described in this annex on the USIM or in non-volatile memory. Instead the UE shall temporarily store these parameters locally in the ME and the UE shall delete these parameters when the UE is deregistered.

If the UE is configured for eCall only mode as specified in 3GPP TS 31.102 [22], the UE shall not store the 5GMM parameters described in this annex on the USIM or in non-volatile memory. Instead the UE shall temporarily store these parameters locally in the ME and the UE shall delete these parameters when the UE enters 5GMM-DEREGISTERED.eCALL-INACTIVE state, the UE is switched-off or the USIM is removed.

The "CAG information list" can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the "CAG information list".

If the UE receives the steering of roaming information over N1 NAS signalling containing the SOR-CMCI, and the Store the SOR-CMCI in the ME indicator is set to "Store SOR-CMCI in ME", then:

- if the length of the SOR-CMCI contents field is not equal to zero, the UE shall store the received SOR-CMCI in the ME's non-volatile memory; or

- if the length of the received SOR-CMCI contents field is equal to zero, the UE shall delete the stored SOR-CMCI in the ME's non- volatile memory, if any.

The ME shall not delete the SOR-CMCI when the UE is switched off. The ME shall delete the SOR-CMCI when a new USIM is inserted.

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

## C.2 Storage of 5GMM information for UEs operating in SNPN access operation mode

The 5GMM information for UEs operating in SNPN access operation mode are stored according to the following conditions:

- if the UE does not support access to an SNPN using credentials from a credentials holder, the following 5GMM parameters shall be stored per subscribed SNPN in a non-volatile memory in the ME together with the subscriber identifier associated with the SNPN identity of the SNPN in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]);and

- if the UE supports access to an SNPN using credentials from a credentials holder, the following 5GMM parameters shall be stored in a non-volatile memory in the ME per:

i) the subscribed SNPN together with the subscriber identifier associated with the selected entry in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]); or

ii) the PLMN subscription together with the SUPI from the USIM which is associated with the PLMN subscription:

a) 5G-GUTI;

b) last visited registered TAI;

c) 5GS update status;

d) 5G NAS security context parameters from a full native 5G NAS security context (see 3GPP TS 33.501 [24]);

e) KAUSF and KSEAF (see 3GPP TS 33.501 [24]);

f) UE parameter update counter (see subclause 9.11.3.53A);

g) configured NSSAI(s);

h) NSSAI inclusion mode(s);

i) MPS indicator;

j) MCS indicator;

k) operator-defined access category definitions;

l) network-assigned UE radio capability IDs; and

m) signalled URSP (see 3GPP TS 24.526 [19]).

NOTE: Steering of roaming does not apply to an SNPN. Therefore, for a KAUSF which is generated for an SNPN, the UE does not store an associated SOR counter in the non-volatile memory.

If the 5GMM parameters are associated with the PLMN subscription, then the 5GMM parameters can only be used if the SUPI from the USIM which is associated with the selected PLMN subscription matches the SUPI stored in the non-volatile memory; else the UE shall delete the 5GMM parameters.

If the 5GMM parameters are associated with the subscribed SNPN of the entry in the "list of subscriber data", then the 5GMM parameters can only be used if the subscriber identifier of the selected entry of the "list of subscriber data" matches the subscriber identifier stored in the non-volatile memory.

Each configured NSSAI consists of S-NSSAI(s) stored together with an SNPN identity, if it is associated with an SNPN.

Each NSSAI inclusion mode is associated with an SNPN identity and access type.

The MPS indicator is stored together with an SNPN identity of the SNPN that provided it, and is valid in that registered SNPN.

The MCS indicator is stored together with an SNPN identity of the SNPN that provided it, and is valid in that registered SNPN.

Operator-defined access category definitions are stored together with an SNPN identity of the SNPN that provided them, and are valid in that SNPN. The maximum number of stored operator-defined access category definitions is UE implementation dependent.

Each network-assigned UE radio capability ID is stored together with an SNPN identity of the SNPN that provided it as well as a mapping to the corresponding UE radio configuration, and is valid in that SNPN. The UE shall be able to store at least the last 16 received network-assigned UE radio capability IDs. There shall be only one network-assigned UE radio capability ID stored for a given combination of SNPN identity and UE radio configuration and any existing UE radio capability ID shall be deleted when a new UE radio capability ID is added for the same combination of SNPN identity and UE radio configuration. If the UE receives a network-assigned UE radio capability ID with a Version ID value different from the value included in the network-assigned UE radio capability ID(s) stored at the UE for the serving SNPN, the UE may delete these stored network-assigned UE radio capability ID(s).

The allowed NSSAI(s) can be stored in a non-volatile memory in the ME. Allowed NSSAI consists of S-NSSAI(s) stored together with an SNPN identity, if it is associated with an SNPN.

\*\*\*\*\* End of changes \*\*\*\*\*