**3GPP TSG-CT WG1 Meeting #123-eC1-20vxxx**

**Electronic meeting, 16-24 April 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **24.501** | **CR** | **2152** | **rev** | **1** | **Current version:** | **16.4.1** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network | **x** |

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| ***Title:*** | Miscellaneous clean-up for SNPN | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | Vertical\_LAN | | | | |  | ***Date:*** | | | 2020-04-22 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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 can be 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Some parts of the TS are updated to clearly indicate that they are applicable to SNPN as well but the other parts are not.  For consistency and clarity, some easy updates are required.  Note that procedural text on the successful case (e.g. 5.5.1.2.1 – 5.5.1.2.4 in case of initial registration) is not in the scope. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Adaptation of the TS to accommodate SNPN | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Inconsistency in the specification; some parts are not entirely clear whether it can be supported in an SNPN. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.1, 4.9.1, 4.9.2, 5.1.3.2.1.3.6, 5.2.2.2.1, 5.4.5.2.5, 5.5.1.3.7, 8.2.6.18, 9.11.3.9, D.1.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 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 it has 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-EA1-3 and 5G-EA4-7 used in the present document corresponds to the term NEA, NEA0, NEA1-3 and NEA4-7 defined in 3GPP TS 33.501 [24].

**5G-IA:** 5GS integrity algorithms. The term 5G-IA, 5G-IA0, 128-5G-IA1-3 and 5G-IA4-7 used in the present document corresponds to the term NIA, NIA0, NIA1-3 and NIA4-7 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 for trusted non-3GPP access used by the N5CW;

- 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 corresponds to the TWIF's start of acting on behalf of the N5CW. 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 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.

**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.

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

**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.

**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 which was 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.

**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.

**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.

**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;

b) configured NSSAI for a PLMN or an SNPN;

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

d) pending NSSAI; and

e) for each access type:

1) allowed NSSAI for a PLMN or an SNPN; and

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

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

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

**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 transiting 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, or an emergency PDU session where there is a radio bearer associated with that PDU session.

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 PLMN**: The PLMN on which the UE is registered. 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, SNPN or rejected NSSAI for the current registration area or rejected NSSAI for the failed or revoked NSSAA.

NOTE 3: Rejected NSSAI only contains a set of S-NSSAI(s) associated with a PLMN identity or SNPN identity for the current PLMN or SNPN.

**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 "rejected NSSAI due to the failed or revoked network slice-specific authentication and authorization".

**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.

**Routing indicator:** Routing Indicator is an identifier assigned by the UE's home network operator to be used together with the Home Network Identifier for routing network signalling. Routing Indicator is provisioned in the USIM. The term Routing indicator used in the present document corresponds to the term Routing ID used in 3GPP TS 23.501 [8].

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

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

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

**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).

**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.

**UE-DS-TT residence time:** The time taken within the UE and DS-TT to forward a packet between the UE and the DS-TT port.

**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;

- 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 [2] apply:

**Non-public network**

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**

**Global Line Identifier (GLI)**

**Global Cable Identifier (GCI)**

**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**

**Selected PLMN**

**Shared network**

**SNPN identity**

**Steering of Roaming (SOR)**

**Steering of Roaming information**

**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**

**Local area data network**

**Network identifier (NID)**

**Network slice**

**NG-RAN**

**Non-allowed area**

**PDU session**

**PDU session type**

**Pending NSSAI**

**Requested NSSAI**

**Routing ID**

**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**

**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**

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**

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**

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

### 4.9.1 General

The UE shall re-enable the N1 mode capability when the UE powers off and powers on again, the USIM is removed, or an entry of the "list of subscriber data" with the SNPN identity of the SNPN is updated.

\*\*\*\*\* 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, 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 reject cause #31 "Redirection to EPC required" as specified in subclauses 5.5.1.2.5 and 5.5.1.3.5, 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 may re-enable the N1 mode capability for 3GPP access, and indicate to lower layers to remain camped in E-UTRA connected to 5GCN of the previously registered PLMN and 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 may re-enable the N1 mode capability for 3GPP access, and indicate to lower layers to remain camped in E-UTRA connected to 5GCN of the previously registered PLMN and 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 E-UTRA capability 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.

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 [13] 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 shall delay enabling the N1 mode capability for 3GPP access until the RR connection is released;

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

- 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; and

- if the UE is in S1 mode and is in EMM-CONNECTED mode as specified in 3GPP TS 24.301 [15], on expiry of the timer, the UE shall delay enabling the N1 mode capability for 3GPP access until the NAS signalling connection in S1 mode is released.

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 \*\*\*\*\*

5.1.3.2.1.3.6 5GMM-DEREGISTERED.NO-SUPI

The substate 5GMM-DEREGISTERED.NO-SUPI is chosen in the UE, if the N1 mode is enabled and the UE has no valid subscriber data available (SIM/USIM not available, the SIM/USIM is considered invalid by the UE or an entry of the "list of subscriber data" with the SNPN identity of the SNPN is considered invalid by the UE).

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

##### 5.2.2.2.1 Selection of the substate after power on

For a UE configured for eCall only mode as specified in 3GPP TS 31.102 [22], timers T3444 and T3445 are considered to have expired at power on. When the UE is switched on, the substate shall be PLMN-SEARCH if the USIM is available and valid or there are valid entries in the "list of subscriber data". See 3GPP TS 23.122 [5] for further details.

The substate chosen after PLMN-SEARCH, following power on is:

a) if no cell can be selected, the substate shall be NO-CELL-AVAILABLE;

b) if no USIM is present or no valid entry in the "list of subscriber data" exists, the substate shall be NO-SUPI;

c) if a suitable cell has been found, the PLMN or SNPN identity of the cell is not in one of the forbidden PLMN lists, "permanently forbidden SNPNs" list, or the "temporarily forbidden SNPNs" list, and the tracking area is not in one of the lists of 5GS forbidden tracking areas, then the substate shall be NORMAL-SERVICE;

d) if the selected cell is known not to be able to provide normal service, then the UE shall enter the substate LIMITED-SERVICE;

e) if the UE is in manual network selection mode and no cell of the selected PLMN or SNPN has been found, the UE shall enter the substate NO-CELL-AVAILABLE; and

f) if the UE is configured for eCall only mode as specified in 3GPP TS 31.102 [22], the substate shall be eCALL-INACTIVE.

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

##### 5.4.5.2.5 Abnormal cases on the network side

The following abnormal cases in AMF are identified:

a) if the Payload container type IE is set to "N1 SM information" and:

1) if the Old PDU session ID IE is not included in the UL NAS TRANSPORT message, the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request" or "MA PDU request", and the SMF selection fails, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

2) if the Old PDU session ID IE is included in the UL NAS TRANSPORT message, the AMF has a PDU session routing context for the old PDU session ID and the UE and does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request", the AMF received a reallocation requested indication from the SMF indicating that the SMF is to be reallocated, and the SMF selection fails, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

3) if the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "existing PDU session" or "MA PDU request", and the user's subscription context obtained from the UDM does not contain an SMF ID for the PDU session ID matching the PDU session ID received from the UE or for the DNN matching the DNN received from the UE such that the SMF ID includes a PLMN identity corresponding to the UE's HPLMN or the current PLMN or the PLMN ID part of the current SNPN, then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

4) if the Old PDU session ID IE is included in the UL NAS TRANSPORT message, and the AMF has a PDU session routing context for the old PDU session ID and the UE and does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request" and the AMF has not received a reallocation requested indication, the AMF should select an SMF with following handlings:

If the S-NSSAI IE is not included and the user's subscription context obtained from UDM:

i) contains one default S-NSSAI, the AMF shall use the default S-NSSAI as the S-NSSAI;

ii) contains two or more default S-NSSAIs, the AMF shall use one of the default S-NSSAIs selected by operator policy as the S-NSSAI; and

iii) does not contain a default S-NSSAI, the AMF shall use an S-NSSAI selected based on operator policy as the S-NSSAI.

Editor's note [eNS; CR# 1996]: It is FFS how the AMF selects an S-NSSAI for the PDU session if {none of the subscribed S-NSSAIs marked as default is included in the allowed NSSAI} or {all subscribed S-NSSAIs marked as default are subject to NSSAA and no NSSAA for these S-NSSAIs is completed as a success}.

If the DNN IE is not included, and the user's subscription context obtained from UDM:

i) contains the default DNN for the S-NSSAI, the AMF shall use the default DNN as the DNN; and

ii) does not contain the default DNN for the S-NSSAI, the AMF shall use a locally configured DNN as the DNN; and

If the DNN selected by the network is a LADN DNN, the AMF shall determine the UE presence in LADN service area.

If the SMF selection is successful, the AMF should store a PDU session routing context for the PDU session ID and the UE, set the SMF ID in the stored PDU session routing context to the selected SMF ID, and forward the 5GSM message, the PDU session ID, the old PDU session ID, the S-NSSAI, the mapped S-NSSAI (if available in roaming scenarios), the DNN determined by the AMF, DNN selected by the network (if different from DNN determined by the AMF), the request type and UE presence in LADN service area (if DNN selected by the network corresponds to an LADN DNN) towards the SMF ID of the PDU session routing context.

If the SMF selection fails, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

5) if the AMF has a PDU session routing context for the PDU session ID and the UE, the PDU session routing context indicates that the PDU session is an emergency PDU session, the Request type IE is set to "initial emergency request", the AMF should forward the 5GSM message, the PDU session ID, the S-NSSAI (if configured in the AMF emergency configuration data), the DNN (if configured in the AMF emergency configuration data) and the request type towards the SMF ID of the PDU session routing context.

6) if the Request type IE is set to "initial emergency request" and the S-NSSAI or the DNN is received, the AMF ignores the received S-NSSAI or the DNN and uses the emergency DNN from the AMF emergency configuration data, if any.

7) if the AMF does not have a PDU session routing context for the PDU session ID and the UE, and the Request type IE of the UL NAS TRANSPORT message is either not provided or is provided but set to other value then "initial request", "existing PDU session", "initial emergency request", "existing emergency PDU session" and "MA PDU request", then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

8) if the AMF unsuccessfully attempted to forward the 5GSM message, the PDU session ID, the S-NSSAI, the mapped S-NSSAI (if available in roaming scenarios), the DNN and the request type (if received) towards a SMF ID, then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

9) the Old PDU session ID IE is included in the UL NAS TRANSPORT message, the AMF does not have a PDU session routing context for the old PDU session ID and the UE, the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request", the AMF should select an SMF with following handlings

If the S-NSSAI IE is not included and the user's subscription context obtained from UDM:

i) contains one default S-NSSAI, the AMF shall use the default S-NSSAI as the S-NSSAI;

ii) contains two or more default S-NSSAIs, the AMF shall use one of the default S-NSSAIs selected by operator policy as the S-NSSAI; and

iii) does not contain a default S-NSSAI, the AMF shall use an S-NSSAI selected based on operator policy as the S-NSSAI.

Editor's note [eNS; CR# 1996]: It is FFS how the AMF selects an S-NSSAI for the PDU session if {none of the subscribed S-NSSAIs marked as default is included in the allowed NSSAI} or {all subscribed S-NSSAIs marked as default are subject to NSSAA and no NSSAA for these S-NSSAIs is completed as a success}.

If the DNN IE is not included, and the user's subscription context obtained from UDM:

i) contains the default DNN for the S-NSSAI, the AMF shall use the default DNN as the DNN; and

ii) does not contain the default DNN for the S-NSSAI, the AMF shall use a locally configured DNN as the DNN; and

If the DNN selected by the network is a LADN DNN, the AMF shall determine the UE presence in LADN service area.

If the SMF selection is successful, the AMF should store a PDU session routing context for the PDU session ID and the UE, set the SMF ID in the stored PDU session routing context to the selected SMF ID, and forward the 5GSM message, the PDU session ID, the old PDU session ID, the S-NSSAI, the mapped S-NSSAI (if available in roaming scenarios), the DNN determined by the AMF, DNN selected by the network (if different from DNN determined by the AMF), the request type and UE presence in LADN service area (if DNN selected by the network corresponds to an LADN DNN) towards the SMF ID of the PDU session routing context.

If the SMF selection fails, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

10) if the AMF has a PDU session routing context for the PDU session ID and the UE, the PDU session routing context indicates that the PDU session is not an emergency PDU session, and the Request type IE is included and is set to "existing emergency PDU session", the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

11) if the AMF has a PDU session routing context for the PDU session ID and the UE, the PDU session routing context indicates that the PDU session is an emergency PDU session, and the Request type IE is included and is set to "existing PDU session", the AMF may forward the 5GSM message, the PDU session ID, the S-NSSAI (if configured in the AMF emergency configuration data), the DNN (if configured in the AMF emergency configuration data), and the request type towards the SMF identified by the SMF ID of the PDU session routing context.

12) if the AMF has a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request", then the AMF shall perform a local release of the PDU session identified by the PDU session ID and shall request the SMF to perform a local release of the PDU session, and proceed as specified in subclause 5.4.5.2.3.

13) if the Request type IE is set to "initial request" and the S-NSSAI IE contains an S-NSSAI that is not allowed by the network, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

14) if the Request type IE is set to "existing PDU session", the AMF has a PDU session routing context for the PDU session ID and the UE, the PDU session routing context indicates that the PDU session is not an emergency PDU session, and the S-NSSAI associated with the PDU session identified by the PDU session ID is not allowed for the target access type, the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

15) if the Request type IE is set to "initial request", "existing PDU session", "modification request" or "MA PDU request", the UE is not configured for high priority access in selected PLMN, and the UE is in non-allowed area or is not in allowed area, the AMF shall send back to the UE the 5GSM message which was not forwarded, and 5GMM cause #28 "Restricted service area" as specified in subclause 5.4.5.3.1 case i).

16) if the Request type IE is set to "initial request" or "MA PDU request", the AMF is pending the receipt of a REGISTRATION REQUEST message indicating "mobility registration updating" in the 5GS registration type IE, and an emergency PDU session exists for the UE (see subclause 5.4.4.3), the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

17) if the timer T3447 is running and the UE supports service gap control:

i) the UE is not configured for high priority access in selected PLMN;

ii) the current NAS signalling connection was not triggered by paging; and

iii) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection,

then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

18) if the AMF has a PDU session routing context for the PDU session ID and the UE, the Request type IE is not included, the UE is not configured for high priority access in selected PLMN, and the PDU session is not an emergency PDU session, then the AMF shall forward the 5GSM message, and the PDU session ID IE towards the SMF identified by the SMF ID of the PDU session routing context with:

i) an exemptionInd attribute indicating "message was exempted from the DNN based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A], if DNN based congestion control is activated for the selected DNN;

ii) an exemptionInd attribute indicating "message was exempted from the S-NSSAI and DNN based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A], if S-NSSAI and DNN based congestion control is activated for the selected S-NSSAI and the selected DNN; or

iii) an exemptionInd attribute indicating "message was exempted from the S-NSSAI only based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A], if S-NSSAI only based congestion control is activated for the selected S-NSSAI.

19) if the Request type IE is set to "MA PDU request" and the S-NSSAI IE contains an S-NSSAI that is not allowed by the network on neither access, then the AMF shall send to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

20) if the Request type IE is set to "initial request" and the UE is registered for emergency services over the current access, then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

b) If the Payload container type IE is set to "SMS" and the AMF does not have an SMSF address associated with the UE or the AMF cannot forward the content of the Payload container IE to the SMSF associated with the SMSF address available in the AMF, the AMF shall abort the procedure.

c) If the Payload container type IE is set to "LTE Positioning Protocol (LPP) message container" and if the Additional information IE is not included in the UL NAS TRANSPORT message or the AMF cannot forward the content of the Payload container IE to the LMF associated with the routing information included in the Additional information IE, the AMF shall abort the procedure.

d) If the Payload container type IE is set to "UE policy container" and the AMF does not have a PCF address associated with the UE or the AMF cannot forward the content of the Payload container IE to the PCF associated with the PCF address available in the AMF, the AMF shall abort the procedure.

e) If the Payload container type IE is set to "Location services message container" and if the Additional information IE is included in the UL NAS TRANSPORT message and the AMF cannot forward the content of the Payload container IE to an LMF associated with the routing information included in the Additional information IE, the AMF shall abort the procedure.

f) If the Payload container type IE is set to "SMS" or "LTE Positioning Protocol (LPP) message container":

1) the timer T3447 is running and the UE supports service gap control;

2) the UE is not configured for high priority access in selected PLMN;

3) the current NAS signalling connection was not triggered by paging; and

4) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment ofthe UE in 5GMM-CONNECTED mode receives mobile terminated signaling or downlink data over the user-plane the current NAS signalling connection,

the AMF shall abort the procedure.

NOTE: In this state the N1 NAS signalling connection can be released by the network.

g) If the Payload container type IE is set to "CIoT user data container" and:

1) if the AMF does not have a PDU session routing context for the PDU session ID and the UE; or

2) if the AMF unsuccessfully attempted to forward the user data conatiner and the PDU session ID,

then the AMF may send back to the UE the CIoT user data container which was not forwarded as specified in subclause 5.4.5.3.1 case l1).

h) If the Payload container type IE is set to "CIoT user data container":

1) if the timer T3447 is running and the UE supports service gap control;

2) the UE is not configured for high priority access in selected PLMN;

3) the current N1 NAS signalling connection was not triggered by paging; and

4) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection,

then the AMF shall send back to the UE the CIoT user data container which was not forwarded as specified in subclause 5.4.5.3.1 case l1).

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

##### 5.5.1.3.7 Abnormal cases in the UE

The following abnormal cases can be identified:

a) Timer T3346 is running.

The UE shall not start the registration procedure for mobility and periodic registration update unless:

1) the UE is in 5GMM-CONNECTED mode;

2) the UE received a paging;

3) the UE receives a NOTIFICATION message over non-3GPP access when the UE is in 5GMM-CONNECTED mode over non-3GPP access and in 5GMM-IDLE mode over 3GPP access;

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

5) the UE has an emergency PDU session established or is establishing an emergency PDU session;

6) the UE receives a request from the upper layers to perform emergency service fallback;

7) the UE receives the CONFIGURATION UPDATE COMMAND message as specified in subclause 5.4.4.3; or

8) the UE in NB-N1 mode is requested by the upper layer to transmit user data related to an exceptional event and:

- the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]); and

- timer T3346 was not started when N1 NAS signalling connection was established with RRC establishment cause set to "mo-ExceptionData".

The UE stays in the current serving cell and applies the normal cell reselection process.

NOTE 1: It is considered an abnormal case if the UE needs to initiate a registration procedure for mobility and periodic registration update while timer T3346 is running independent on whether timer T3346 was started due to an abnormal case or a non-successful case.

If the registration procedure for mobility and periodic registration update was initiated for an MO MMTEL voice call (i.e. access category 4), for an MO 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 IMS registration related signalling (i.e. access category 9), then a notification that the procedure was not initiated due to network congestion shall be provided to upper layers.

b) The lower layers indicate that the access attempt is barred.

The UE shall not start the registration procedure for mobility and periodic registration update. The UE stays in the current serving cell and applies the normal cell reselection process. Receipt of the access barred indication shall not trigger the selection of a different core network type (EPC or 5GCN).

The registration procedure for mobility and periodic registration update is started, if still needed, when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated.

ba) The lower layers indicate that access barring is applicable for all access categories except categories 0 and 2 and the access category with which the access attempt was associated is other than 0 and 2.

If the REGISTRATION REQUEST message has not been sent, the UE shall proceed as specified for case b. If the REGISTRATION REQUEST message has been sent, the UE shall proceed as specified for case e and, additionally, the registration procedure for mobility and periodic registration update is started, if still needed, when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated. For additional UE requirements for both cases see subclause 4.5.5.

c) T3510 timeout.

The UE shall abort the registration update procedure and the NAS signalling connection, if any, shall be released locally. The UE shall proceed as described below.

d) REGISTRATION REJECT message, other 5GMM cause values than those treated in subclause 5.5.1.3.5, and cases of 5GMM cause values #11, #22, #31, #72, #73, #74, #75, #76 and #77, if considered as abnormal cases according to subclause 5.5.1.3.5.

Upon reception of the 5GMM causes #95, #96, #97, #99 and #111 the UE should set the registration attempt counter to 5.

The UE shall proceed as described below.

e) Lower layer failure, release of the NAS signalling connection received from lower layers or the lower layers indicate that the RRC connection has been suspended without a cell change before the REGISTRATION ACCEPT or REGISTRATION REJECT message is received.

The UE shall abort the registration procedure and proceed as described below.

f) Change of cell into a new tracking area.

If a cell change into a new tracking area occurs before the registration procedure for mobility and periodic registration update is completed, the registration procedure for mobility and periodic registration update shall be aborted and re-initiated immediately. The UE shall set the 5GS update status to 5U2 NOT UPDATED.

g) Registration procedure for mobility and periodic registration update and de-registration procedure collision.

If the UE receives a DEREGISTRATION REQUEST message without 5GMM cause value #11, #12, #13 or #15 before the registration procedure for mobility and periodic registration update has been completed, the registration procedure for mobility and periodic registration update shall be aborted and the de-registration procedure shall be progressed.

If the UE receives a DEREGISTRATION REQUEST message with 5GMM cause value #11, #12, #13 or #15 before the registration procedure for mobility and periodic registration update has been completed, the registration procedure for mobility and periodic registration update shall be progressed and the de-registration procedure shall be aborted.

NOTE 2: The registration procedure for mobility and periodic registration update shall be aborted only if the DEREGISTRATION REQUEST message indicates in the access type that the access in which the registration procedure for mobility and periodic registration update was attempted shall be de-registered. Otherwise both the procedures shall be progressed.

h) Void

i) Transmission failure of REGISTRATION REQUEST message indication from the lower layers or the lower layers indicate that the RRC connection has been suspended with a cell change.

The registration procedure for mobility and periodic registration update shall be aborted and re-initiated immediately. The UE shall set the 5GS update status to 5U2 NOT UPDATED.

j) Transmission failure of REGISTRATION COMPLETE message indication with TAI change from lower layers.

If the current TAI is not in the TAI list, the registration procedure for mobility and periodic registration update shall be aborted and re-initiated immediately. The UE shall set the 5GS update status to 5U2 NOT UPDATED.

If the current TAI is still part of the TAI list, it is up to the UE implementation how to re-run the ongoing procedure.

k) Transmission failure of REGISTRATION COMPLETE message indication without TAI change from lower layers.

It is up to the UE implementation how to re-run the ongoing procedure.

l) UE-initiated de-registration required.

De-registration due to removal of USIM or entry update in the "list of subscriber data" or due to switch off:

The registration procedure for mobility and periodic registration update shall be aborted, and the UE initiated de-registration procedure shall be performed.

De-registration not due to removal of USIM or entry update in the "list of subscriber data" and not due to switch off:

the UE initiated de-registration procedure shall be initiated after successful completion of the registration procedure for mobility and periodic registration update.

m) Timer T3447 is running

The UE shall not start any mobility and periodic registration update procedure with Uplink data status IE or Follow-on request indicator set to "Follow-on request pending" unless:

- the UE received a paging;

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

- the UE has an emergency PDU session established or is establishing an emergency PDU session; or

- the UE receives a request from the upper layers to perform emergency service fallback;

The UE stays in the current serving cell and applies the normal cell reselection process. The mobility and periodic registration update procedure is started, if still necessary, when timer T3447 expires.

n) Timer T3448 is running

The UE in 5GMM-IDLE mode shall not start any mobility and periodic registration update procedure with Follow-on request indicator set to "Follow-on request pending" unless:

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

2) the UE which is only using 5GS services with control plane CIoT 5GS optimization received a paging request; or

3) the UE in NB-N1 mode is requested by the upper layer to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]).

The UE stays in the current serving cell and applies the normal cell reselection process. The mobility and periodic registration update procedure is started, if still necessary, when timer T3448 expires.

For the cases c, d and e the UE shall proceed as follows:

Timer T3510 shall be stopped if still running.

The registration attempt counter shall be incremented, unless it was already set to 5.

If the registration attempt counter is less than 5:

- if the TAI of the current serving cell is not included in the TAI list or the 5GS update status is different to 5U1 UPDATED or if the registration procedure was triggered due to cases c, g, n, v in subclause 5.5.1.3.2, the UE shall start timer T3511, shall set the 5GS update status to 5U2 NOT UPDATED and change to state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE. When timer T3511 expires, the registration update procedure is triggered again.

- if the TAI of the current serving cell is included in the TAI list, the 5GS update status is equal to 5U1 UPDATED, and the UE is not performing the registration procedure after an inter-system change from S1 mode to N1 mode, the UE shall keep the 5GS update status to 5U1 UPDATED and enter state 5GMM-REGISTERED.NORMAL-SERVICE. The UE shall start timer T3511. If in addition the REGISTRATION REQUEST message did not include the MICO indication IE or the Extended DRX IE, and:

- the REGISTRATION REQUEST message indicated "periodic registration updating";

- the registration procedure was initiated to recover the NAS signalling connection due to "RRC Connection failure" from the lower layers; or

- the registration procedure was initiated by the UE in 5GMM-CONNECTED mode with RRC inactive indication entering a cell in the current registration area belonging to an equivalent PLMN of the registered PLMN and not belonging to the registered PLMN,

and none of the other reasons for initiating the registration updating procedure listed in subclause 5.5.1.3.2 was applicable, the timer T3511 may be stopped when the UE enters 5GMM-CONNECTED mode.

- if the TAI of the current serving cell is included in the TAI list, the 5GS update status is equal to 5U1 UPDATED and the UE is performing the registration procedure after an inter-system change from S1 mode to N1 mode, the UE shall change the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE. The UE shall start timer T3511.

- If the procedure is performed via 3GPP access and the UE is operating in single registration mode, the UE shall in addition handle the EPS update status as specified in 3GPP TS 24.301 [15] for the abnormal cases when a normal or periodic tracking area updating procedure fails and the tracking area attempt counter is less than 5 and the EPS update status is different from EU1 UPDATED.

If the registration attempt counter is equal to 5

- the UE shall start timer T3502, shall set the 5GS update status to 5U2 NOT UPDATED.

- the UE shall delete the list of equivalent PLMNs (if any) and shall change to state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE or optionally to 5GMM-REGISTERED.PLMN-SEARCH in order to perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5].

- if the procedure is performed via 3GPP access and the UE is operating in single-registration mode:

- the UE shall in addition handle the EPS update status as specified in 3GPP TS 24.301 [15] for the abnormal cases when a normal or periodic tracking area updating procedure fails and the tracking area attempt counter is equal to 5; and

- if the UE does not change to state 5GMM-REGISTERED.PLMN-SEARCH, the UE shall attempt to select E-UTRAN radio access technology. The UE may disable the N1 mode capability as specified in subclause 4.9.

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

#### 8.2.6.18 Payload container

Within a PLMN, this IE shall be included if the UE has one or more stored UE policy sections identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN for the registration procedure for mobility and periodic registration update due to inter-system change from S1 mode to N1 mode of a UE operating in the single-registration mode or for the registration procedure for initial registration.

Within an SNPN, this IE shall be included if the UE has one or more stored UE policy sections for the selected SNPN for the registration procedure for initial registration.

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

#### 9.11.3.9 5GS tracking area identity list

The purpose of the 5GS tracking area identity list information element is to transfer a list of tracking areas from the network to the UE.

The coding of the information element allows combining different types of lists. The lists of type "00" and "01" allow a more compact encoding, when the different TAIs are sharing the PLMN identity.

The 5GS tracking area identity list information element is coded as shown in figure 9.11.3.8.1, figure 9.11.3.8.2, figure 9.11.3.9.3, figure 9.11.3.9.4 and table 9.11.3.9.1.

The 5GS tracking area identity list is a type 4 information element, with a minimum length of 9 octets and a maximum length of 114 octets. The list can contain a maximum of 16 different tracking area identities.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS tracking area identity list IEI | | | | | | | | octet 1 |
| Length of 5GS tracking area identity list contents | | | | | | | | octet 2 |
| Partial tracking area identity list 1 | | | | | | | | octet 3  octet i |
| Partial tracking area identity list 2 | | | | | | | | octet i+1\*  octet l\* |
| … | | | | | | | | octet l+1\*  octet m\* |
| Partial tracking area identity list p | | | | | | | | octet m+1\*  octet n\* |

Figure 9.11.3.9.1: 5GS tracking area identity list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |
| … | | | | | | | | … |
| … | | | | | | | | … |
| TAC k | | | | | | | | octet 3k+2\* |
| TAC k (continued) | | | | | | | | octet 3k+3\* |
| TAC k (continued) | | | | | | | | octet 3k+4\* |

Figure 9.11.3.9.2: Partial tracking area identity list – type of list = "00"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |

Figure 9.11.3.9.3: Partial tracking area identity list – type of list = "01"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 8\* |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 9\* |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 10\* |
| TAC 2 | | | | | | | | octet 11\* |
| TAC 2 (continued) | | | | | | | | octet 12\* |
| TAC 2 (continued) | | | | | | | | octet 13\* |
| … | | | | | | | |  |
| … | | | | | | | |  |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 6k-4\* |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 6k-3\* |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 6k-2\* |
| TAC k | | | | | | | | octet 6k-1\* |
| TAC k (continued) | | | | | | | | octet 6k\* |
| TAC k (continued) | | | | | | | | octet 6k+1\* |

Figure 9.11.3.9.4: Partial tracking area identity list – type of list = "10"

Table 9.11.3.9.1: Tracking area identity list information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Value part of the Tracking area identity list information element (octets 3 to n) | | | | | |
|  | | | | | |
| The value part of the Tracking area identity list information element consists of one or several partial tracking area identity lists. The length of each partial tracking area identity list can be determined from the 'type of list' field and the 'number of elements' field in the first octet of the partial tracking area identity list. | | | | | |
| The UE shall store the complete list received. If more than 16 TAIs are included in this information element, the UE shall store the first 16 TAIs and ignore the remaining octets of the information element. | | | | | |
|  | | | | | |
|  | | | | | |
| Partial tracking area identity list: | | | | | |
|  | | | | | |
| Type of list (octet 1) | | | | | |
| Bits | | | | | |
| 7 | 6 |  | | | |
| 0 | 0 | list of TACs belonging to one PLMN or SNPN, with non-consecutive TAC values | | | |
| 0 | 1 | list of TACs belonging to one PLMN or SNPN, with consecutive TAC values | | | |
| 1 | 0 | list of TAIs belonging to different PLMNs (see NOTE) | | | |
|  | | | | | |
| All other values are reserved. | | | | | |
|  | | | | | |
| Number of elements (octet 1) | | | | | |
| Bits | | | | | |
| 5 | 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | 0 | 1 element |
| 0 | 0 | 0 | 0 | 1 | 2 elements |
| 0 | 0 | 0 | 1 | 0 | 3 elements |
| … | | | | |  |
| 0 | 1 | 1 | 0 | 1 | 14 elements |
| 0 | 1 | 1 | 1 | 0 | 15 elements |
| 0 | 1 | 1 | 1 | 1 | 16 elements |
|  | | | | | |
| All other values are unused and shall be interpreted as 16, if received by the UE. | | | | | |
|  | | | | | |
| Bit 8 of octet 1 is spare and shall be coded as zero. | | | | | |
|  | | | | | |
|  | | | | | |
| For type of list = "00" and number of elements = k: | | | | | |
|  | | | | | |
| octet 2 to 4 contain the MCC+MNC, and | | | | | |
| for j = 1, …, k: | | | | | |
| octets 3j+2 to 3j+4 contain the TAC of the j-th TAI belonging to the partial list, | | | | | |
|  | | | | | |
| For type of list = "01" and number of elements = k: | | | | | |
|  | | | | | |
| octet 2 to 4 contain the MCC+MNC, and | | | | | |
| octets 5 to 7 contain the TAC of the first TAI belonging to the partial list. | | | | | |
| The TAC values of the other k-1 TAIs are TAC+1, TAC+2, …, TAC+k-1. | | | | | |
|  | | | | | |
| For type of list = "10" and number of elements = k: | | | | | |
|  | | | | | |
| for j = 1, …, k. | | | | | |
| octets 6j-4 to 6j-2 contain the MCC+MNC, and | | | | | |
| octets 6j-1 to 6j+1 contain the TAC of the j-th TAI belonging to the partial list. | | | | | |
|  | | | | | |
|  | | | | | |
| MCC, Mobile country code | | | | | |
|  | | | | | |
| The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | | | | |
|  | | | | | |
| MNC, Mobile network code | | | | | |
|  | | | | | |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111". | | | | | |
|  | | | | | |
| TAC, Tracking area code | | | | | |
|  | | | | | |
| In the TAC field bit 8 of the first octet is the most significant bit and bit 1 of third octet the least significant bit. | | | | | |
| The coding of the tracking area code is the responsibility of each administration. Coding using full hexadecimal representation may be used. The tracking area code consists of 3 octets. | | | | | |
|  | | | | | |
| NOTE: If the "list of TAIs belonging to different PLMNs" is used, the PLMNs included in the list need to be present in the list of "equivalent PLMNs". This type of list is not applicable in an SNPN. | | | | | |

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

### D.1.1 Overview

The PCF may provide the UE with one or more UE policies using the network-requested UE policy management procedure. The UE provides the PCF with a list of one or more stored UE policy section identifiers (UPSIs), and the PCF provides each UE policy using one or more UE policy sections, each identified by a UPSI. The UPSI is composed of two parts:

a) a PLMN ID part containing:

1) the PLMN ID for the PLMN; or

2) the PLMN ID part of the SNPN identity for the SNPN;

of the PCF which provides the UE policies; and

b) a UE policy section code (UPSC) containing a value assigned by the PCF.

The UE processes the UE policy sections, each identified by the UPSI, received from the PCF and informs the PCF of the result.

The UE provides the PCF with the UE policy related capabilities such as the UE's support for ANDSP and the UE's OS Id.

The UE can also request the PCF to provide V2XP as specified in 3GPP TS 24.587 [19B].