**3GPP TSG-CT WG1 Meeting #123-eC1-202097**

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

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **24.501** | **CR** | **1643** | **rev** | **3** | **Current version:** | **16.4.0** |  |
|  |
| *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:***  | Correct EPS SRVCC support indication when registering with 5GS |
|  |  |
| ***Source to WG:*** | BlackBerry UK Ltd. |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5GS\_Ph1-CT |  | ***Date:*** | 2020-04-06 |
|  |  |  |  |  |
| ***Category:*** | **A** |  | ***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 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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | **BACKGROUND**When the UE indicates via NAS that it supports SRVCC, TS 24.237 specifies that the SCC AS obtains this indication when the UE performs a SIP registration. Based on this information the SCC AS informs the ATCF and returns an STN-SR back to the HSS.**PROBLEM**A UE can support only “4G-”SRVCC (i.e. 5G SRVCC is not supported by the US), attach to the 5GS, and register using SIP via 5GS. The UE can originate or terminate a SIP voice session via 5GS, and subsequently transfer the SIP voice session to EPS.However, if the SCC AS was not informed about the UE’s SRVCC capability, a subsequent attempt to transfer the same SIP voice session to CS using SRVCC procedures, will fail.**NOTE: a CT4 CR against TS 29.502 depends on this CT1 CR!** |
|  |  |
| ***Summary of change:*** | Indicate support for (5G-)SRVCC via NAS. If the UE supports SRVCC or 5G-SRVCC, enable anchoring of a SIP call initiated over 5GS IP-CAN and enable updating of STN-SR in the HSS.Clarify however that codecs and classmark are still only included during NAS registration when 5G-SRVCC between NG-RAN and CS is supported by the UE.**NIT:** adding a “t” in 6.1.4a |
|  |  |
| ***Consequences if not approved:*** | UEs “attaching” to 5GS, supporting SRVCC will, after transfer to EPS, fail the SRVCC procedures (in an EPS network that does support SRVCC). |
|  |  |
| ***Clauses affected:*** | 3.1, 5.5.1.2.2, 5.5.1.3.2, 6.1.4a, 9.11.3.1 |
|  |  |
|  | **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:*** |  |

\*\*\* First change \*\*\*

## 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].

**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:

**5G-SRVCC**

**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 \*\*\*

##### 5.5.1.2.2 Initial registration initiation

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

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

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

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

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

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

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

with the following clarifications to initial registration for emergency services:

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

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

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

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

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

a) Void

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

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

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

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

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

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

If the UE is operating in the dual-registration mode and it is in EMM state EMM-REGISTERED, the UE shall include the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state".

NOTE 2: Inclusion of the UE status IE with this setting corresponds to the indication that the UE is "moving from EPC" as specified in 3GPP TS 23.502 [9].

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

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

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

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

Editor's note: Whether different UE specific DRX parameters are used for NB-N1 mode and how to request them is FFS.

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

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

- request specific LADN DNNs by including a LADN DNN value in the LADN indication IE for each LADN DNN for which the UE requests LADN information; or

- to indicate a request for LADN information by not including any LADN DNN value in the LADN indication IE.

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

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

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

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

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

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

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

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

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

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

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

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

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

NOTE 5: The UE does not have to set the Follow-on request indicator to 1, even if the UE has to request resources for V2X communication over PC5 reference point.

If the UE supports S1 mode, the UE shall:

- set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

- include the S1 UE network capability IE in the REGISTRATION REQUEST message; and

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

If the UE supports the LTE positioning protocol (LPP) in N1 mode as specified in 3GPP TS 36.355 [26], the UE shall set the LPP bit to "LPP in N1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

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

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

If the UE supports:

- SRVCC from E-UTRAN to GERAN/UTRAN; or

- 5G-SRVCC from NG-RAN to UTRAN;

as specified in 3GPP TS 23.216 [6A], the UE shall set the 5G-SRVCC from NG-RAN to UTRAN or SRVCC from E-UTRAN to UTRAN or GERAN capability bit to "5G-SRVCC from NG-RAN to UTRAN and SRVCC from UTRAN HSPA or E-UTRAN to GERAN or UTRAN supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A], the UE shall include the Mobile station classmark 2 IE and the Supported codecs IE in the REGISTRATION REQUEST message.

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

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

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

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

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

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

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

c) if the UE:

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

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

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

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

NOTE 6: In this version of the protocol, the UE can only include the Payload container IE in the REGISTRATION REQUEST message to carry a payload of type "UE policy container".

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

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

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

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

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

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

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



Figure 5.5.1.2.2.1: Registration procedure for initial registration

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

##### 5.5.1.3.2 Mobility and periodic registration update initiation

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

a) when the UE detects entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF;

b) when the periodic registration updating timer T3512 expires in 5GMM-IDLE mode;

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

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

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

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

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

h) when the UE's usage setting changes;

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

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

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

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

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

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

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

p) void;

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

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

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

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

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

NOTE 1: A change in the eDRX usage conditions at the UE can include e.g. a change in the UE configuration, a change in requirements from upper layers or the battery running low at the UE.

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

w) when the UE in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE decides to request new network slices after being rejected due to no allowed network slices requested;

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

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

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

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

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

If case b) is the only reason for initiating the registration procedure for mobility and periodic registration update, the UE shall indicate "periodic registration updating" in the 5GS registration type IE; otherwise the UE shall indicate "mobility registration updating".

If the UE indicates "mobility registration updating" in the 5GS registration type IE and the UE supports S1 mode, the UE shall:

- set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

- include the S1 UE network capability IE in the REGISTRATION REQUEST message; and

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

If the UE supports the LTE positioning protocol (LPP) in N1 mode as specified in 3GPP TS 36.355 [26], the UE shall set the LPP bit to "LPP in N1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

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

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

If the UE supports:

- SRVCC from E-UTRAN to GERAN/UTRAN; or

- 5G-SRVCC from NG-RAN to UTRAN;

as specified in 3GPP TS 23.216 [6A], the UE shall set the 5G-SRVCC from NG-RAN to UTRAN or SRVCC from E-UTRAN to UTRAN or GERAN capability bit to "5G-SRVCC from NG-RAN to UTRAN and SRVCC from UTRAN HSPA or E-UTRAN to GERAN or UTRAN supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b.

If the UE supports 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A], the UE shall include the Mobile station classmark 2 IE and the Supported codecs IE in the REGISTRATION REQUEST message for all cases except case b.

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

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

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

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

NOTE 2: In this version of the protocol, the UE can only include the Payload container IE in the REGISTRATION REQUEST message to carry a payload of type "UE policy container".

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

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

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

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

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

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

a) if the UE is operating in the single-registration mode, performs inter-system change from S1 mode to N1 mode, and the UE holds a valid 4G-GUTI, the UE shall include the 5G-GUTI mapped from the 4G-GUTI as specified in 3GPP TS 23.003 [4] in the 5GS mobile identity IE. Additionally, if the UE holds a valid 5G‑GUTI, the UE shall include the 5G-GUTI in the Additional GUTI IE in the REGISTRATION REQUEST message in the following order:

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

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

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

b) for all other cases, if the UE holds a valid 5G-GUTI, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE.

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

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

Editor's note: Whether different UE specific DRX parameters are used for NB-N1 mode and how to request them is FFS.

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

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

- request specific LADN DNNs by including a LADN DNN value in the LADN indication IE for each LADN DNN for which the UE requests LADN information; or

- to indicate a request for LADN information by not including any LADN DNN value in the LADN indication IE.

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

- not associated with control plane only indication;

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

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

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

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

When the registration procedure for mobility and periodic registration update is initiated in 5GMM-IDLE mode, the UE may include a PDU session status IE in the REGISTRATION REQUEST message, indicating which PDU sessions associated with the access type the REGISTRATION REQUEST message is sent over are active in the UE.

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

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

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

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

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

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

c) shall include a TRACKING AREA UPDATE REQUEST message as specified in 3GPP TS 24.301 [15] in the EPS NAS message container IE in the REGISTRATION REQUEST message if the registration procedure is initiated in 5GMM-IDLE mode; and

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

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

a) is in NB-N1 mode and:

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

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

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

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

NOTE 4: The REGISTRATION REQUEST message can include both the Requested NSSAI and the Requested mapped NSSAI as described below.

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

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

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

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

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

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

b) each active PDU session.

The Requested mapped NSSAI IE shall include mapped S-NSSAI(s), if available, when the UE does not have S-NSSAI(s) applicable in the current PLMN for:

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

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

NOTE 5: The Requested NSSAI IE is used instead of Requested mapped NSSAI IE in REGISTRATION REQUEST message when the UE enters (E)HPLMN.

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

If the UE has:

- no allowed NSSAI for the current PLMN;

- configured NSSAI for the current PLMN;

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

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

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

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

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

If the UE has:

- no allowed NSSAI for the current PLMN;

- no configured NSSAI for the current PLMN;

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

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

- no default configured NSSAI

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

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

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

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

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

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

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

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

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

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

For case n), the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "NG-RAN radio capability update needed". Additionally, if the UE is not in NB-N1 mode, the UE supports RACS and the UE has an applicable UE radio capability ID for the new UE radio configuration in the serving PLMN or SNPN, the UE shall include the applicable UE radio capability ID in the UE radio capability ID of the REGISTRATION REQUEST message.

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

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

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

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

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

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

b) if the UE:

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

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

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

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

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

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

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

The UE shall set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE if the UE supports WUS assistance information and does not have an emergency PDU session. The UE may include its UE paging probability information in the Requested WUS assistance information IE if the UE has set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE.If the UE does not have a valid 5G NAS security context and the UE is sending the REGISTRATION REQUEST message after an inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode, the UE shall send the REGISTRATION REQUEST message without including the NAS message container IE. The UE shall include the entire REGISTRATION REQUEST message (i.e. containing cleartext IEs and non-cleartext IEs, if any) in the NAS message container IE that is sent as part of the SECURITY MODE COMPLETE message as described in subclauses 4.4.6 and 5.4.2.3.

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

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

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

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

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

a) from 5GMM-IDLE mode; and

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

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

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

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



Figure 5.5.1.3.2.1: Registration procedure for mobility and periodic registration update

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

### 6.1.4a Coordination between 5GSM and SM

Coordination between 5GSM and SM states is not required.

After the 5G-SRVCC handover from NG-RAN to UTRAN (see 3GPP TS 23.216 [6A]), all the PDU sessions of the UE are locally released at the UE and the network.

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

#### 9.11.3.1 5GMM capability

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

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

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GMM capability IEI | octet 1 |
| Length of 5GMM capability contents | octet 2 |
| SGC | 5G-HC-CP CIoT | N3 data | 5G-CP CIoT | RestrictEC | LPP | HO attach | S1 mode | octet 3 |
| RACS | NSSAA | 5G-LCS | V2XCNPC5 | V2XCEPC5 | V2X | 5G-UP CIoT | SRVCC | octet 4\* |
| 0 | 0 | 0 | 0 | 0 | 0 | WUSA | CAG | Octet 5\* |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | octet 6\*-15\* |
| Spare |

Figure 9.11.3.1.1: 5GMM capability information element

Table 9.11.3.1.1: 5GMM capability information element

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

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

 |
| Location Services (5G-LCS) notification mechanisms capability (octet 4, bit 6) |
| 0 |  |  |  | LCS notification mechanisms not supported |
| 1 |  |  |  | LCS notification mechanisms supported (see 3GPP TS 23.273 [6B]) |
| Network slice-specific authentication and authorization (NSSAA) (octet 4, bit 7)This bit indicates the capability to support network slice-specific authentication and authorization. |
| 0 |  |  |  | Network slice-specific authentication and authorization not supported |
| 1 |  |  |  | Network slice-specific authentication and authorization supported |
|  |
| Radio capability signalling optimisation (RACS) capability (octet 4, bit 8) |
| 0 |  |  |  | RACS not supported |
| 1 |  |  |  | RACS supported |
|  |
| Closed Access Group (CAG) capability (octet 5, bit 1) |
| 0 |  |  |  | CAG not supported |
| 1 |  |  |  | CAG supported |
|  |
|  |
| WUS assistance (WUSA) information reception capability (octet 5, bit 2) |
| 0 |  |  |  | WUS assistance information reception not supported |
| 1 |  |  |  | WUS assistance information reception supported |
|  |
| bits 3-8 in octet 5 and bits in octets 6 to 15 are spare and shall be coded as zero, if the respective octet is included in the information element. |

\*\*\* No more changes \*\*\*