**3GPP TSG-CT WG1 Meeting #141eC1-232534**

**Online 17– 21 April 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **24.501** | **CR** | **5328** | **rev** | **-** | **Current version:** | **18.2.1** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network | **x** |

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|  |
| ***Title:***  | General introduction on support of network slice usage control |
|  |  |
| ***Source to WG:*** | LG Electronics |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | eNS\_Ph3 |  | ***Date:*** | 2023-04-10 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | A new stage 2 requirement on improved network control of the UE behaviour for a network slices was introduced in S2-2303810. *The network-controlled Slice Usage Policy is provided to the UE in the Registration Accept or the UE Configuration Update Command and may include:**- An indication, for one or more of S-NSSAI(s) of the HPLMN in the Configured NSSAI, whether the UE only registers with the Network Slice with the network when applications in the UE require data transmission in the Network Slice (i.e. the UE can only register the Network Slice only on demand and consider the Network Slice as on demand S-NSSAI).**- For all on demand S-NSSAI(s) of the HPLMN in the Configured NSSAI, a deregistration inactivity timer that causes the UE to deregister the Network Slice after the last PDU Session associated with the S-NSSAI is released. This deregistration inactivity timer is started at the UE and AMF per access type when the last PDU Session associated with the S-NSSAI is released, or the Network Slice is included in the Allowed NSSAI and no PDU session is established. The deregistration inactivity timer is stopped and reset when the first PDU session is established or the S-NSSAI is removed from the Allowed NSSAI. The AMF and UE may locally remove the S-NSSAI from the Allowed NSSAI when the timer expires. The AMF may also send a UE Configuration Update Command to remove the slice from the Allowed NSSAI.* |
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| ***Summary of change:*** | Stage 3 aspects of the network control of the UE behaviour for a network slices are specified.  |
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| ***Consequences if not approved:*** | No support of network slice usage control. |
|  |  |
| ***Clauses affected:*** |  |
|  |  |
|  | **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 when no N1 NAS signalling connection between the UE and network over non-3GPP access exists. The term 5GMM-IDLE mode over non-3GPP access used in the present document corresponds to the term CM-IDLE state for non-3GPP access used in 3GPP TS 23.501 [8].

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Alternative NSSAI:** A list of mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI.

**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 and emergency services fallback also to subscribers who are not members of the CAG.

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

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

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

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

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

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

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

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

**Current TAI:** A TAI of a selected PLMN broadcast in the cell on which the UE is camping. If the cell is a satellite NG-RAN cell broadcasting multiple TACs of the selected PLMN, the UE NAS layer selects the current TAI from these multiple TACs of the selected PLMN as specified in subclause 4.23.5.

NOTE 2: For the purpose of this definition, the selected PLMN can either be the registered PLMN or a PLMN selected according to PLMN selection rules as specified in 3GPP TS 23.122 [5].

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

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

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

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

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

**HPLMN S-NSSAI**: An S-NSSAI applicable in the HPLMN without any further mapping by the network. If the UE has an EHPLMN list which is not empty, and the HPLMN code derived from the IMSI is included in the EHPLMN list, then the HPLMN S-NSSAIs are applicable without any further mapping in the HPLMN derived from the IMSI. If the HPLMN code derived from the IMSI is not included in the EHPLMN list, then the HPLMN S-NSSAIs are applicable without any further mapping in the highest priority EHPLMN.

The UE considers as HPLMN S-NSSAIs at least the following S-NSSAIs:

a) any S-NSSAI included in the configured NSSAI or allowed NSSAI for a PLMN or SNPN if it is provided by

1) the HPLMN, if the EHPLMN list is not present or is empty;

2) the EHPLMN whose PLMN code is derived from the IMSI;

3) the highest priority EHPLMN, if an EHPLMN list is available and not empty and the HPLMN code derived from the IMSI is not included in the EHPLMN list; or

4) the subscribed SNPN;

b) any S-NSSAI provided as mapped S-NSSAI for the configured NSSAI or allowed NSSAI for a PLMN or SNPN;

c) any S-NSSAI associated with a PDU session if there is no mapped S-NSSAI associated with the PDU session and the UE is

1) in the HPLMN, if the EHPLMN list is not present or is empty;

2) the EHPLMN whose PLMN code is derived from the IMSI;

3) the highest priority EHPLMN, if any is available and the HPLMN code derived from the IMSI is not included in the EHPLMN list; or

4) in the subscribed SNPN; and

d) any mapped S-NSSAI associated with a PDU session.

NOTE 3: The above list is not intended to be complete. E.g., also in case of PLMN the S-NSSAIs included in URSP rules or in the signalling messages for network slice-specific authentication and authorization are HPLMN S-NSSAIs.

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

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

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

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

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

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

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

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

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

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

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

**Initial registration for disaster roaming services:** A registration performed with 5GS registration type "disaster roaming initial 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. If the cell is a satellite NG-RAN cell broadcasting multiple TAIs, a TAI which is contained in the registration area that the UE registered to the network and last selected by the UE as the current TAI.

**Mapped 5G-GUTI:** A 5G-GUTI which is mapped from a 4G-GUTI previously allocated by an MME. Mapping rules are defined in 3GPP TS 23.003 [4].

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

**Mobility registration for disaster roaming services:** A registration performed with 5GS registration type "disaster roaming mobility registration updating" in the REGISTRATION REQUEST message.

**MUSIM UE:** A UE with multiple valid USIMs, capable of initiating and maintaining simultaneous separate registration states over 3GPP access with PLMN(s) using identities and credentials associated with those USIMs and supporting one or more of the N1 NAS signalling connection release, the paging indication for voice services, the reject paging request, the paging restriction and the paging timing collision control (see 3GPP TS 23.501 [8]).

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

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

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

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

**Non-equivalent PLMN**: A PLMN which is not an equivalent PLMN.

**Non-equivalent SNPN**: An SNPN which is not an equivalent SNPN.

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

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

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

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

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

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

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

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

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

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

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

a) default configured NSSAI for PLMN or SNPN;

b) configured NSSAI for a PLMN or an SNPN;

b1) NSSRG information for the configured NSSAI for a PLMN or an SNPN;

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

d) pending NSSAI for a PLMN or an SNPN;

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

f) rejected NSSAI for the current PLMN or SNPN;

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

h) rejected NSSAI for the failed or revoked NSSAA;

i) for each access type:

1) allowed NSSAI for a PLMN or an SNPN;

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

3) rejected NSSAI for the current registration area;

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

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

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

j) for 3GPP access type:

1) NSAG information for the configured NSSAI for a PLMN or an SNPN.

**NITZ information: Network Identity and Time Zone (NITZ) information includes full name for network, short name for network, local time zone, universal time and local time zone, network daylight saving time.**

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

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

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

**Onboarding SUPI:** SUPI with the SUPI format "network specific identifier" containing a network specific identifier or with the SUPI format "IMSI" containing an IMSI, derived by a UE in SNPN access operation mode, from default UE credentials for primary authentication and used to identify the UE during initial registration for onboarding services in SNPN and while registered for onboarding services in SNPN.

**On-demand S-NSSAI:** An S-NSSAI that the UE is allowed to be registered with the network only when this S-NSSAI is used by the UE to establish a PDU session for user data transmission.

**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 an LADN or a PDU session with a DNN and an S-NSSAI associated with an LADN..

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

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

NOTE 4: 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 disaster roaming services:** A UE is considered as "registered for disaster roaming services" when it has successfully completed initial registration or mobility registration for disaster roaming services.

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

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

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

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

NOTE 5: Rejected NSSAI for the current PLMN or SNPN, rejected NSSAI for the current registration area or rejected NSSAI for the maximum number of UEs reached contains a set of S-NSSAI(s) associated with a PLMN identity or SNPN identity for the current PLMN or SNPN and in roaming scenarios also contains a set of mapped S-NSSAI(s) if available. Rejected NSSAI for the failed or revoked NSSAA only contains a set of S-NSSAI(s) associated with a PLMN identity or SNPN identity for the HPLMN or RSNPN.

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

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

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

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

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

NOTE 6: Local release can include communication among network entities.

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

**SNPN access operation mode**: A UE operating in SNPN access operation mode only selects SNPNs. This includes the case when the UE is accessing an SNPN over 3GPP access, the case when the UE is accessing an SNPN over non-3GPP access and the case where the UE is accessing SNPN services via a PLMN

NOTE 7: In this release of specification, the term "SNPN access operation mode" is the same as the term "SNPN access mode" 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.

**Satellite NG-RAN RAT type:** In case of satellite NG-RAN access, RAT types are used to distinguish different types of satellite NG-RAN access, as defined in 3GPP TS 38.413 [31]. In this version of the specification, the defined satellite NG-RAN RAT types are "NR(LEO)", "NR(MEO)" and "NR(GEO)".

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

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

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

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

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

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

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

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

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

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

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

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

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

**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.

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

**Non-public network**

**Disaster Roaming**

**satellite NG-RAN**

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

**5G-GUTI**

**5G-S-TMSI**

**5G-TMSI**

**Global Line Identifier (GLI)**

**Global Cable Identifier (GCI)**

**GUAMI**

**IMEI**

**IMEISV**

**IMSI**

**PEI**

**SUPI**

**SUCI**

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

**CAG selection**

**CAG-ID authorized based on "Allowed CAG list"**

**Country**

**EHPLMN**

**HPLMN**

**Onboarding services in SNPN**

**Registered SNPN**

**Selected PLMN**

**Selected SNPN**

**Shared network**

**SNPN identity**

**Steering of Roaming (SOR)**

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

**Steering of Roaming information**

**Subscribed SNPN**

**Suitable cell**

**VPLMN**

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

**eCall over IMS**

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

**SRVCC**

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

**eCall only mode**

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

**5G access network**

**5G core network**

**5G QoS flow**

**5G QoS identifier**

**5G-RG**

**5G-BRG**

**5G-CRG**

**5G System**

**Allowed area**

**Allowed NSSAI**

**Alternative S-NSSAI**

**AMF region**

**AMF set**

**Closed access group**

**Configured NSSAI**

**Credentials Holder (CH)**

**Default Credentials Server (DCS)**

**Group ID for Network Selection (GIN)**

**IAB-node**

**Local area data network**

**N3QAI**

**Network identifier (NID)**

**Network slice**

**NG-RAN**

**Non-allowed area**

**Onboarding Standalone Non-Public Network**

**PDU connectivity service**

**PDU session**

**PDU session type**

**PEGC**

**PEMC**

**Pending NSSAI**

**PIN**

**PINE**

**PINE-to-PINE direct communication**

**PINE-to-PINE indirect communication**

**Requested NSSAI**

**Routing Indicator**

**Service data flow**

**Service Gap Control**

**Serving PLMN rate control**

**Small data rate control status**

**SNPN-enabled UE**

**Stand-alone Non-Public Network**

**Time Sensitive Communication**

**Time Sensitive Communication and Time Synchronization Function**

**UE-DS-TT residence time**

**UE-Slice-MBR**

**UE presence in LADN service area**

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

**UE local configuration**

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

**GMM**

**MM**

**A/Gb mode**

**Iu mode**

**GPRS**

**Non-GPRS**

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

**CIoT EPS optimization**

**Control plane CIoT EPS optimization**

**EENLV**

**EMM**

**EMM-DEREGISTERED**

**EMM-DEREGISTERED-INITIATED**

**EMM-IDLE mode**

**EMM-NULL**

**EMM-REGISTERED**

**EMM-REGISTERED-INITIATED**

**EMM-SERVICE-REQUEST-INITIATED**

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

**EPS**

**EPS security context**

**EPS services**

**Lower layer failure**

**Megabit**

**Message header**

**NAS signalling connection recovery**

**Native GUTI**

**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**

**Default UE credentials for primary authentication**

**Default UE credentials for secondary authentication**

**Full native 5G NAS security context**

**K'**AME

**K**AMF

**K**ASME

**Mapped 5G NAS security context**

**Mapped security context**

**Native 5G NAS security context**

**NCC**

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

**Partial native 5G NAS security context**

**RES\***

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

**NG connection**

**User Location Information**

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

**E-UTRA-PC5**

**NR-PC5**

**V2X**

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

**3GPP UAV ID**

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

**Command and Control (C2) Communication**

**UAV controller (UAV-C)**

**UAS Services**

**UAS Service Supplier (USS)**

**Uncrewed Aerial System (UAS)**

**USS communication**

**UUAA**

**UUAA-MM**

**UUAA-SM**

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

**5G ProSe**

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

**Edge Application Server**

**Edge DNS Client**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 24.526 [19] apply:

**Non-subscribed SNPN signalled URSP**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 24.577 [60] apply:

**A2X**

\* \* \* Next Change \* \* \* \*

### 4.6.1 General

The 5GS supports network slicing as described in 3GPP TS 23.501 [8]. Within a PLMN or SNPN, a network slice is identified by an S-NSSAI, which is comprised of a slice/service type (SST) and a slice differentiator (SD). Inclusion of an SD in an S-NSSAI is optional. A set of one or more S-NSSAIs is called the NSSAI. The following S-NSSAIs and NSSAIs are defined in 3GPP TS 23.501 [8]:

a) configured NSSAI;

b) requested NSSAI;

c) allowed NSSAI;

d) subscribed S-NSSAIs;

e) pending NSSAI;and

f) alternative S-NSSAIs.

The following NSSAIs are defined in the present document:

a) rejected NSSAI for the current PLMN or SNPN;

b) rejected NSSAI for the current registration area;

c) rejected NSSAI for the failed or revoked NSSAA; and

d) rejected NSSAI for the maximum number of UEs reached.

In roaming scenarios, rejected NSSAI for the current PLMN or SNPN, or rejected NSSAI for the current registration area, or rejected NSSAI for the maximum number of UEs reached includes one or more S-NSSAI for the current PLMN and also contains a set of mapped S-NSSAI(s). An S-NSSAI included in the rejected NSSAI for the failed or revoked NSSAA is an HPLMN S-NSSAI.

In case of a PLMN, a serving PLMN may configure a UE with the configured NSSAI per PLMN, NSSRG information if the UE has indicated it supports the subscription-based restrictions to simultaneous registration of network slices feature, and network slice usage control information if the UE has indicated it supports the network slice usage control feature. In addition, the HPLMN may configure a UE with a single default configured NSSAI and consider the default configured NSSAI as valid in a PLMN for which the UE has neither a configured NSSAI nor an allowed NSSAI.

Editor's note: Roaming aspects are FFS for the network slice usage control feature.

NOTE 1: The value(s) used in the default configured NSSAI are expected to be commonly decided by all roaming partners, e.g., values standardized by 3GPP or other bodies.

In case of an SNPN, the SNPN may configure a UE with a configured NSSAI applicable to the SNPN, NSSRG information if the UE has indicated it support the subscription-based restrictions to simultaneous registration of network slices feature, if the UE is neither registering nor registered for onboarding services in SNPN, and network slice usage control information if the UE has indicated it supports the network slice usage control feature. In addition, the credential holder may configure a single default configured NSSAI associated with the selected entry of the "list of subscriber data" or the PLMN subscription and consider the default configured NSSAI as valid in a SNPN for which the UE has neither a configured NSSAI nor an allowed NSSAI. If the UE is registering or registered for onboarding services in SNPN, the serving SNPN shall not provide a configured NSSAI to the UE.

The allowed NSSAI and the rejected NSSAI for the current registration area are managed per access type independently, i.e. 3GPP access or non-3GPP access, and is applicable for the registration area. If the UE does not have a valid registration area, the rejected NSSAI for the current registration area is applicable to the tracking area on which it was received. If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the allowed NSSAI, the rejected NSSAI for the current registration area, rejected NSSAI for the failed or revoked NSSAA and rejected NSSAI for the maximum number of UEs reached are applicable to these PLMNs in this registration area.

The allowed NSSAI that is associated with a registration area containing TAIs belonging to different PLMNs, which are equivalent PLMNs, can be used to form the requested NSSAI for any of the equivalent PLMNs when the UE is outside of the registration area where the allowed NSSAI was received.

When the network slice-specific authentication and authorization procedure is to be initiated for one or more S-NSSAIs in the requested NSSAI or the network slice-specific authentication and authorization procedure is ongoing for one or more S-NSSAIs, these S-NSSAI(s) will be included in the pending NSSAI. When the network slice-specific authentication and authorization procedure is completed for an NSSAI that has been in the pending NSSAI, the S-NSSAI will be moved to the allowed NSSAI or rejected NSSAI depending on the outcome of the procedure. The AMF sends the updated allowed NSSAI to the UE over the same access of the requested S-NSSAI. The AMF sends the updated rejected NSSAI over either 3GPP access or non-3GPP access. The pending NSSAI is managed regardless of access type i.e. the pending NSSAI is applicable to both 3GPP access and non-3GPP access for the current PLMN even if sent over only one of the accesses. If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the pending NSSAI is applicable to these PLMNs in this registration area.

The rejected NSSAI for the current PLMN or SNPN is applicable for the whole registered PLMN or SNPN. The AMF shall only send a rejected NSSAI for the current PLMN when the registration area consists of TAIs that only belong to the registered PLMN. If the UE receives a rejected NSSAI for the current PLMN, and the registration area also contains TAIs belonging to different PLMNs, the UE shall treat the received rejected NSSAI for the current PLMN as applicable to the whole registered PLMN.

The rejected NSSAI for the failed or revoked NSSAA includes one or more S-NSSAIs that have failed the network slice-specific authentication and authorization or for which the authorization have been revoked, and are applicable for the whole registered PLMN or SNPN.

The rejected NSSAI for the maximum number of UEs reached is applicable for the whole registered PLMN or SNPN, and the access type over which the rejected NSSAI was sent. The AMF shall send a rejected NSSAI including S-NSSAI(s) with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", when one or more S-NSSAIs are indicated that the maximum number of UEs has been reached. If the timer T3526 associated with the S-NSSAI(s) was started upon reception of the rejected NSSAI for the maximum number of UEs reached, the UE may remove the S-NSSAI(s) from the rejected NSSAI including S-NSSAI(s) with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", if the timer T3526 associated with the S-NSSAI(s) expires. If one or more S-NSSAIs are removed from the rejected NSSAI for the maximum number of UEs reached, the timer T3526 associated with the removed S-NSSAI(s) shall be stopped, if running. The UE shall not stop the timer T3526 if the UE selects an E-UTRA cell connected to EPC.

If the UE receives a rejected NSSAI for the maximum number of UEs reached, the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the UE shall treat the received rejected NSSAI for the maximum number of UEs reached as applicable to these equivalent PLMNs when the UE is in this registration area.

If the UE has indicated that the UE supports network slice replacement feature and the AMF determines to provide the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI to the UE, the network shall provide the UE with the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI. The S-NSSAI to be replaced and the alternative S-NSSAI are managed per access type independently, i.e. 3GPP access or non-3GPP access, and are applicable for the registration area.

NOTE 2: Based on local policies, the UE can remove an S-NSSAI from the rejected NSSAI for the failed or revoked NSSAA when the UE wants to register to the slice identified by this S-NSSAI.

NOTE 3: Based on network local policy, network slice-specific authentication and authorization procedure can be initiated by the AMF for an S-NSSAI in rejected NSSAI for the failed or revoked NSSAA when the S-NSSAI is requested by the UE based on its local policy.

NOTE 4: At least one S-NSSAI in the default configured NSSAI or at least one default S-NSSAI is recommended as not subject to network slice-specific authentication and authorization, in order to ensure that at least one PDU session can be established to access service, even when Network Slice-specific Authentication and Authorization fails.

NOTE 5: At least one S-NSSAI in the default configured NSSAI or at least one default S-NSSAI is recommended as not subject to network slice admission control, in order to ensure that at least one PDU session can be established to access service.

NOTE 6: The rejected NSSAI can be provided by the network via either Rejected NSSAI IE or the Extended rejected NSSAI IE.

\* \* \* Next Change \* \* \* \*

#### 4.6.2.x Mobility management based network slice usage control

If the UE and network support network slice usage control, the AMF monitors network slice usages by running a slice deregistration inactivity timer per S-NSSAI and access type in case it becomes the allowed S-NSSAI but has no associated PDU sessions for a certain time. The slice deregistration inactivity timer is:

1. started when the S-NSSAI is not used by any PDU session over the corresponding access type, and
2. stopped and reset when at least a PDU Session associated with the S-NSSAI is successfully established or the S-NSSAI is removed form the Allowed NSSAI.

Upon expiry of the slice deregistration inactivity timer, the AMF removes the S-NSSAI from the Allowed NSSAI over the access type by sending the UE Configuration Update Command to the UE(s) if the UE supports network slice usage control.

If the UE supports network slice usage control, the AMF provides slice usage control information in the REGISTRATION ACCEPT message or the UE Configuration Update Command and includes:

1. an indication of on-demand NSSAI in the Configured NSSAI; and
2. a deregistration inactivity timer value for all On-demand S-NSSAI(s) of the HPLMN in the Configured NSSAI.

Editor's note: Roaming aspects are FFS.\* \* \* End Change \* \* \* \*