**3GPP TSG-SA2 Meeting #154EAH *S2-2301483***

**Elbonia, January 16 - 20, 2023 (revision of S2-2300995r08)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.501** | **CR** | **4035** | **rev** | **1** | **Current version:** | **18.0.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Introduction of partially Allowed NSSAI and Partially Rejected S-NSSAI | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Lenovo, Ericsson, LG Electronics, Huawei, Samsung, ZTE, NEC, Qualcomm, Apple, Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNS\_Ph3 | | | | |  | ***Date:*** | | | 2023-01-20 |
|  |  | | | |  | |  | | |  |
| ***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 can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As part of the KI#5 in the FS\_eNS\_Ph3 study, the TR 23.700-41 V2.0.0 has concluded in clause 8.5 the following new mechanisms:  - Partially rejected S-NSSAI: "*AMF can provide information to the UE enabling the UE to be able to register an S-NSSAI that is rejected S-NSSAI for the RA, when the UE moves to a TA supporting the S-NSSAI. AMF can provide additional IE to the UE e.g. Partially rejected S-NSSAI in the registration procedure and the UE configuration update procedure if the UE indicates that it supports this feature...* "; and  - Partially allowed S-NSSAI: "*If a requested S-NSSAI is not supported in the current TA but supported in other TAs part of the RA, or the requested S-NSSAI is supported in the current TA but not supported in all other TAs of the RA, the AMF (for supporting UEs) may indicate to the UE that some S-NSSAIs are allowed only in some TAs of the RA by indicating the TAs where these are supported and also registered....* ".  It is up to the network deployment and local configuration whether to use both mechanisms, or only one of them.  The following principles are proposed to be specified:   1. The UE indicates to the AMF the " Partial Network Slice support in a RA "capability. 2. For UEs that indicate such capability The AMF determines the RA and whether to include the Rejected S-NSSAI(s) partially in the RA and/or Partially Allowed NSSAI in the Registration Accept message or UCU Command message based whether the S-NSSAIs of the Requested NSSAI are deployed in the current TA and the other TAs part of the RA, (c) AMF local configuration. 3. The UE stores the Rejected S-NSSAI(s) partially in the RA and/or Partially Allowed NSSAI information. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | It is proposed to specify the partially Allowed NSSAI and Rejected S-NSSAI(s) partially in the RA (according to the conclusions of the KI#5 from the TR 23.700-41). | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The conclusion from the FS\_eNS\_Ph3 will not be implemented in the normative specificaitons. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.1, 5.3.4.3.1, 5.3.4.3.4, 5.4.4a, 5.15.1, 5.15.4.1.1, 5.15.4.1.2, new 5.15.X, 6.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

## **1st CHANGE**

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 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 TR 21.905 [1].

**5G VN Group:** A set of UEs using private communication for 5G LAN-type service.

**5G Access Network:** An access network comprising a NG-RAN and/or non-3GPP AN connecting to a 5G Core Network.

**5G Access Stratum-based Time Distribution:** A time synchronization distribution method that is used by an NG-RAN to provide the 5GS time to the UE(s) over the radio interface using procedures specified in TS 38.331 [28].

**5G Core Network:** The core network specified in the present document. It connects to a 5G Access Network.

**5G LAN-Type Service:** A service over the 5G system offering private communication using IP and/or non-IP type communications.

**5G LAN-Virtual Network:** A virtual network over the 5G system capable of supporting 5G LAN-type service.

**5G NSWO:** The 5G NSWO is the capability provided by 5G system and by UE to enable the connection to a WLAN access network using 5GS credentials without registration to 5GS.

**5G QoS Flow or QoS Flow:** The finest granularity for QoS forwarding treatment in the 5G System. All traffic mapped to the same 5G QoS Flow receive the same forwarding treatment (e.g. scheduling policy, queue management policy, rate shaping policy, RLC configuration, etc.). Providing different QoS forwarding treatment requires separate 5G QoS Flow.

**5G QoS Identifier:** A scalar that is used as a reference to a specific QoS forwarding behaviour (e.g. packet loss rate, packet delay budget) to be provided to a 5G QoS Flow. This may be implemented in the access network by the 5QI referencing node specific parameters that control the QoS forwarding treatment (e.g. scheduling weights, admission thresholds, queue management thresholds, link layer protocol configuration, etc.).

**5G System:** 3GPP system consisting of 5G Access Network (AN), 5G Core Network and UE.

**5G-BRG:** The 5G-BRG is a 5G-RG defined in BBF.

**5G-CRG:** The 5G-CRG is a 5G-RG specified in DOCSIS MULPI [89].

**5G-RG:** A 5G-RG is a RG capable of connecting to 5GC playing the role of a UE with regard to the 5G core. It supports secure element and exchanges N1 signalling with 5GC. The 5G-RG can be either a 5G-BRG or 5G-CRG.

**Access Traffic Steering:** The procedure that selects an access network for a new data flow and transfers the traffic of this data flow over the selected access network. Access traffic steering is applicable between one 3GPP access and one non-3GPP access.

**Access Traffic Switching:** The procedure that moves all traffic of an ongoing data flow from one access network to another access network in a way that maintains the continuity of the data flow. Access traffic switching is applicable between one 3GPP access and one non-3GPP access.

**Access Traffic Splitting:** The procedure that splits the traffic of a data flow across multiple access networks. When traffic splitting is applied to a data flow, some traffic of the data flow is transferred via one access and some other traffic of the same data flow is transferred via another access. Access traffic splitting is applicable between one 3GPP access and one non-3GPP access.

**Allowed NSSAI**: Indicating the S-NSSAIs values the UE could use in the Serving PLMN in the current Registration Area.

**Allowed Area:** Area where the UE is allowed to initiate communication as specified in clause 5.3.2.3.

**AMF Region:** An AMF Region consists of one or multiple AMF Sets.

**AMF Set:** An AMF Set consists of some AMFs that serve a given area and Network Slice(s). AMF Set is unique within an AMF Region and it comprises of AMFs that support the same Network Slice(s). Multiple AMF Sets may be defined per AMF Region. The AMF instances in the same AMF Set may be geographically distributed but have access to the same context data.

**Application Identifier:** An identifier that can be mapped to a specific application traffic detection rule.

**AUSF Group ID:** This refers to one or more AUSF instances managing a specific set of SUPIs. An AUSF Group consists of one or multiple AUSF Sets.

**Binding Indication:** Information included by a NF service producer to a NF service consumer in request responses or notifications to convey the scope within which selection/reselection of target NF/NF Services may be performed, or information included by the NF service consumer in requests or subscriptions to convey the scope within which selection/reselection of notification targets or the selection of other service(s) that the NF consumer produces for the same data context may be performed. See clause 6.3.1.0.

**BSF Group ID:** This refers to one or more BSF instances managing a specific set of SUPIs or GPSIs. A BSF Group consists of one or multiple BSF Sets.

**Configured NSSAI:** NSSAI provisioned in the UE applicable to one or more PLMNs.

**CHF Group ID:** This refers to one or more CHF instances managing a specific set of SUPIs.

**Credentials Holder:** Entity which authenticates and authorizes access to an SNPN separate from the Credentials Holder.

**Default UE credentials:** Information configured in the UE to make the UE uniquely identifiable and verifiably secure to perform UE onboarding.

**Default Credentials Server (DCS):** An entity that can perform authentication based on the Default UE credentials or provide means for another entity to perform authentication based on the Default UE credentials.

**Delegated Discovery:** This refers to delegating the discovery and associated selection of NF instances or NF service instances to an SCP.

**Direct Communication:** This refers to the communication between NFs or NF services without using an SCP.

**Disaster Condition:** See definition in TS 22.261 [2].

**Disaster Inbound Roamer:** See definition in TS 22.261 [2].

**Disaster Roaming:** See definition in TS 22.261 [2].

**DN Access Identifier (DNAI):** Identifier of a user plane access to one or more DN(s) where applications are deployed.

**Emergency Registered:** A UE is considered Emergency Registered over an Access Type in a PLMN when registered for emergency services only over this Access Type in this PLMN.

**Endpoint Address:** An address in the format of an IP address or FQDN, which is used to determine the host/authority part of the target URI. This Target URI is used to access an NF service (i.e. to invoke service operations) of an NF service producer or for notifications to an NF service consumer.

**En-gNB:** as defined in TS 37.340 [31].

**Expected UE Behaviour:** Set of parameters provisioned by an external party to 5G network functions on the foreseen or expected UE behaviour, see clause 5.20.

**Fixed Network Residential Gateway:** A Fixed Network RG (FN-RG) is a RG that it does not support N1 signalling and it is not 5GC capable.

**Fixed Network Broadband Residential Gateway:** A Fixed Network RG (FN-BRG) is a FN-RG specified in BBF TR‑124 [90].

**Fixed Network Cable Residential Gateway:** A Fixed Network Cable RG (FN-CRG) is a FN-RG with cable modem specified in DOCSIS MULPI [89].

**Forbidden Area:** An area where the UE is not allowed to initiate communication as specified in clause 5.3.2.3.

**GBR QoS Flow:** A QoS Flow using the GBR resource type or the Delay-critical GBR resource type and requiring guaranteed flow bit rate.

**Group ID for Network Selection (GIN):** An identifier used during SNPN selection to enhance the likelihood of selecting a preferred SNPN that supports a Default Credentials Server or a Credentials Holder.

**(g)PTP-based Time Distribution:** a method to distribute timing among entities in a (g)PTP domain using PTP messages generated by a GM (in the case the GM is external to 5GS) or by 5GS (in the case the 5GS acts as a GM for a given (g)PTP domain). Possible dependencies between (g)PTP-based Time Distribution and 5G Access Stratum-based Time Distribution are described in clause 5.27.1. The synchronization process is described in clause 5.27.1 and follows the applicable profiles of IEEE Std 802.1AS [104] or IEEE Std 1588 [126].

**Home Network Public Key Identifier:** An identifier used to indicate which public/private key pair is used for SUPI protection and de-concealment of the SUCI as specified in TS 23.003 [19].

**IAB-donor:** This is a NG-RAN node that supports Integrated access and backhaul (IAB) feature and provides connection to the core network to IAB-nodes. It supports the CU function of the CU/DU architecture for IAB defined in TS 38.401 [42].

**IAB-node:** A relay node that supports wireless in-band and out-of-band relaying of NR access traffic via NR Uu backhaul links. It supports the UE function and the DU function of the CU/DU architecture for IAB defined in TS 38.401 [42].

**Indirect Communication:** This refers to the communication between NFs or NF services via an SCP.

**Initial Registration:** UE registration in RM-DEREGISTERED state as specified in clause 5.3.2.

**Intermediate SMF (I-SMF):** An SMF that is inserted to support a PDU session as the UE is located in an area which cannot be controlled by the original SMF because the UPF(s) belong to a different SMF Service Area.

**Local Area Data Network:** a DN that is accessible by the UE only in specific locations, that provides connectivity to a specific DNN, and whose availability is provided to the UE.

**Local Break Out (LBO):** Roaming scenario for a PDU Session where the PDU Session Anchor and its controlling SMF are located in the serving PLMN (VPLMN).

**LTE-M:** a 3GPP RAT type Identifier used in the Core Network only, which is a sub-type of E-UTRA RAT type, and defined to identify in the Core Network the E-UTRA when used by a UE indicating Category M.

**MA PDU Session:** A PDU Session that provides a PDU connectivity service, which can use one access network at a time, or simultaneously one 3GPP access network and one non-3GPP access network.

**Mobile Base Station Relay:** A mobile base station acts as a relay between a UE and the 5G network. Such mobile base station relay can for example be mounted on a moving vehicle and serve UEs that can be located inside or outside the vehicle (or entering/leaving the vehicle). See description of TS 22.261 [2]. A mobile Base Station Relay is supported in 5GS with the IAB-architecture with mobility as specified in clause 5.35A and that described in TS 38.401 [42].

**Mobility Pattern:** Network concept of determining within the AMF the UE mobility parameters as specified in clause 5.3.2.4.

**Mobility Registration Update:** UE re-registration when entering new TA outside the TAI List as specified in clause 5.3.2.

**MPS-subscribed UE:** A UE having a USIM with MPS subscription.

**Multi-USIM UE:** A UE with multiple USIMs, capable of maintaining a separate registration state with a PLMN for each USIM at least over 3GPP Access and supporting one or more of the features described in clause 5.38.

**NB-IoT UE Priority:** Numerical value used by the NG-RAN to prioritise between different UEs accessing via NB-IoT.

**NGAP UE association:** The logical per UE association between a 5G-AN node and an AMF.

**NGAP UE-TNLA-binding:** The binding between a NGAP UE association and a specific TNL association for a given UE.

**Network Function:** A 3GPP adopted or 3GPP defined processing function in a network, which has defined functional behaviour and 3GPP defined interfaces.

NOTE 1: A network function can be implemented either as a network element on a dedicated hardware, as a software instance running on a dedicated hardware, or as a virtualised function instantiated on an appropriate platform, e.g. on a cloud infrastructure.

**Network Instance**: Information identifying a domain. Used by the UPF for traffic detection and routing.

**Network Slice:** A logical network that provides specific network capabilities and network characteristics.

**Network Slice instance:** A set of Network Function instances and the required resources (e.g. compute, storage and networking resources) which form a deployed Network Slice.

**Non-GBR QoS Flow:** A QoS Flow using the Non-GBR resource type and not requiring guaranteed flow bit rate.

**NSI ID:** an identifier for identifying the Core Network part of a Network Slice instance when multiple Network Slice instances of the same Network Slice are deployed, and there is a need to differentiate between them in the 5GC.

**NF instance:** an identifiable instance of the NF.

**NF service:** a functionality exposed by a NF through a service-based interface and consumed by other authorized NFs.

**NF service instance:** an identifiable instance of the NF service.

**NF service operation:** An elementary unit a NF service is composed of.

**NF Service Set:** A group of interchangeable NF service instances of the same service type within an NF instance. The NF service instances in the same NF Service Set have access to the same context data.

**NF Set:** A group of interchangeable NF instances of the same type, supporting the same services and the same Network Slice(s). The NF instances in the same NF Set may be geographically distributed but have access to the same context data.

**NG-RAN:** A radio access network that supports one or more of the following options with the common characteristics that it connects to 5GC:

1) Standalone New Radio.

2) New Radio is the anchor with E-UTRA extensions.

3) Standalone E-UTRA.

4) E-UTRA is the anchor with New Radio extensions.

**Non-Allowed Area:** Area where the UE is allowed to initiate Registration procedure but no other communication as specified in clause 5.3.2.3.

Non-Public Network: See definition in TS 22.261 [2].

**Non-Seamless Non-3GPP offload:** The offload of user plane traffic via non-3GPP access without traversing either N3IWF/TNGF or UPF.

**Non-Seamless WLAN offload:** Non-Seamless Non-3GPP offload when the non-3GPP access network is WLAN.

**Onboarding Network:** Either a PLMN enabling Remote Provisioning for a registered UE, or an Onboarding SNPN.

**Onboarding Standalone Non-Public Network:** An SNPN providing Onboarding access and enabling Remote Provisioning for a UE registered for Onboarding as specified in clause 4.2.2.2.4 of TS 23.502 [3].

**Partially Allowed NSSAI**: Includes the S-NSSAI values, each one associated with a subset of TAs, within the Registration Area where the S-NSSAI is supported.

**PCF Group ID:** This refers to one or more PCF instances managing a specific set of SUPIs. A PCF Group consists of one or multiple PCF Sets.

**Pending NSSAI:** NSSAI provided by the Serving PLMN during a Registration procedure, indicating the S-NSSAI(s) for which the network slice-specific authentication and authorization procedure is pending.

**PDU Connectivity Service:** A service that provides exchange of PDUs between a UE and a Data Network.

**PDU Session:** Association between the UE and a Data Network that provides a PDU connectivity service.

**PDU Session Type:** The type of PDU Session which can be IPv4, IPv6, IPv4v6, Ethernet or Unstructured.

**Periodic Registration Update:** UE re-registration at expiry of periodic registration timer as specified in clause 5.3.2.

**PLMN with Disaster Condition:** A PLMN to which a Disaster Condition applies.

**Pre-configured 5QI:** Pre-defined QoS characteristics configured in the AN and 5GC and referenced via a non-standardized 5QI value.

**Private communication:** See definition in TS 22.261 [2].

**Provisioning Server:** Entity that provisions network credentials and other data in the UE to enable SNPN access.

**PTP domain:** As defined in IEEE Std 1588 [126].

**Public network integrated NPN:** A non-public network deployed with the support of a PLMN.

**(Radio) Access Network**: See 5G Access Network.

**RAT type:** Identifies the transmission technology used in the access network for both 3GPP accesses and non-3GPP Accesses, for example, NR, NB-IOT, Untrusted Non-3GPP, Trusted Non-3GPP, Trusted IEEE 802.11 Non-3GPP access, Wireline, Wireline-Cable, Wireline-BBF, etc.

**NR RedCap:** a 3GPP RAT type Identifier used in the Core Network only, which is a sub-type of NR RAT type, and defined to identify in the Core Network the NR when used by a UE indicating NR RedCap.

**Requested NSSAI:** NSSAI provided by the UE to the Serving PLMN during registration.

**Residential Gateway:** The Residential Gateway (RG) is a device providing, for example voice, data, broadcast video, video on demand, to other devices in customer premises.

**Routing Binding Indication:** Information included in a request or notification and that can be used by the SCP for discovery and associated selection to of a suitable target. See clauses 6.3.1.0 and 7.1.2

**Routing Indicator:** Indicator that allows together with SUCI/SUPI Home Network Identifier to route network signalling to AUSF and UDM instances capable to serve the subscriber.

**SCP Domain:** A configured group of one or more SCP(s) and zero or more NF instances(s). An SCP within the group can communicate with any NF instance or SCP within the same group directly, i.e. without passing through an intermediate SCP.

**SNPN-enabled UE:** A UE configured to use stand-alone Non-Public Networks.

**SNPN access mode:** A UE operating in SNPN access mode only selects stand-alone Non-Public Networks.

**Service based interface:** It represents how a set of services is provided/exposed by a given NF.

**Service Continuity:** The uninterrupted user experience of a service, including the cases where the IP address and/or anchoring point change.

**Service Data Flow Filter:** A set of packet flow header parameter values/ranges used to identify one or more of the (IP or Ethernet) packet flows constituting a Service Data Flow.

**Service Data Flow Template:** The set of Service Data Flow filters in a policy rule or an application identifier in a policy rule referring to an application detection filter, required for defining a Service Data Flow.

**Session Continuity:** The continuity of a PDU Session. For PDU Session of IPv4 or IPv6 or IPv4v6 type "session continuity" implies that the IP address is preserved for the lifetime of the PDU Session.

**SMF Service Area:** The collection of UPF Service Areas of all UPFs which can be controlled by one SMF.

**SNPN ID:** PLMN ID and NID identifying an SNPN.

**Stand-alone Non-Public Network:** A non-public network not relying on network functions provided by a PLMN

**Subscribed S-NSSAI**: S-NSSAI based on subscriber information, which a UE is subscribed to use in a PLMN

**Subscription Owner Standalone Non-Public Network:** A Standalone Non-Public Network owning the subscription of a UE and providing subscription data to the UE via a Provisioning Server during the onboarding procedure.

**Survival Time:** The time that an application consuming a communication service may continue without an anticipated message.

NOTE 2: Taken from clause 3.1 of TS 22.261 [2].

**Target NSSAI:** NSSAI provided by the Serving PLMN to the NG-RAN to cause the NG-RAN to attempt to steer the UE to a cell supporting the Network Slices identified by the S-NSSAIs in this NSSAI. See clause 5.3.4.3.3 for more details.

**Time Sensitive Communication (TSC):** A communication service that supports deterministic communication (i.e. which ensures a maximum delay) and/or isochronous communication with high reliability and availability. It is about providing packet transport with QoS characteristics such as bounds on latency, loss, and reliability, where end systems and relay/transmit nodes may or may not be strictly synchronized.

**TSN working domain:** Synchronization domain for a localized set of devices collaborating on a specific task or work function in a TSN network, corresponding to a gPTP domain defined in IEEE 802.1AS [104].

**UDM Group ID:** This refers to one or more UDM instances managing a specific set of SUPIs. An UDM Group consists of one or multiple UDM Sets.

**UDR Group ID:** This refers to one or more UDR instances managing a specific set of SUPIs. An UDR Group consists of one or multiple UDR Sets.

**UE-DS-TT Residence Time:** The time taken within the UE and DS-TT to forward a packet, i.e. between the ingress of the UE and the DS-TT port in the DL direction, or between the DS-TT port and the egress of the UE in the UL direction. UE-DS-TT Residence Time is provided at the time of PDU Session Establishment by the UE to the network.

NOTE 3: UE-DS-TT Residence Time is the same for uplink and downlink traffic and applies to all QoS Flows.

**UPF Service Area**: An area consisting of one or more TA(s) within which PDU Session associated with the UPF can be served by (R)AN nodes via a N3 interface between the (R)AN and the UPF without need to add a new UPF in between or to remove/re-allocate the UPF.

**Uplink Classifier:** UPF functionality that aims at diverting Uplink traffic, based on filter rules provided by SMF, towards Data Network.

**WB-E-UTRA:** In the RAN, WB-E-UTRA is the part of E-UTRA that excludes NB-IoT. In the Core Network, WB-E-UTRA also excludes LTE-M.

**Wireline 5G Access Network:** The Wireline 5G Access Network (W-5GAN) is a wireline AN that connects to a 5GC via N2 and N3 reference points. The W-5GAN can be either a W-5GBAN or W-5GCAN.

**Wireline 5G Cable Access Network:** The Wireline 5G Cable Access Network (W-5GCAN) is the Access Network defined in CableLabs.

**Wireline BBF Access Network:** The Wireline 5G BBF Access Network (W-5GBAN) is the Access Network defined in BBF.

**Wireline Access Gateway Function (W-AGF):** The Wireline Access Gateway Function (W-AGF) is a Network function in W-5GAN that provides connectivity to the 5G Core to 5G-RG and FN-RG.

NOTE 4: If one AUSF/PCF/UDR/UDM group consists of multiple AUSF/PCF/UDR/UDM Sets, AUSF/PCF/UDR/UDM instance from different Set may be selected to serve the same UE. The temporary data which is not shared across different Sets may be lost, e.g. the event subscriptions stored at one UDM instance are lost if another UDM instance from different Set is selected and no data shared across the UDM Sets.

**2nd CHANGE**

5.3.4.3 Radio Resource Management functions

5.3.4.3.1 General

To support radio resource management in NG-RAN the AMF provides the parameter 'Index to RAT/Frequency Selection Priority' (RFSP Index) to NG-RAN across N2. The RFSP Index is mapped by the RAN to locally defined configuration in order to apply specific RRM strategies, taking into account any available information in RAN. The RFSP Index is UE specific and applies to all the Radio Bearers. Examples of how this parameter may be used by the RAN:

- to derive UE specific cell reselection priorities to control idle mode camping.

- to decide on redirecting active mode UEs to different frequency layers or RATs (e.g. see clause 5.3.4.3.2).

The HPLMN may set the RFSP Index taking into account the Subscribed S-NSSAIs. The AMF receives the subscribed RFSP Index from the UDM (e.g. during the Registration procedure). For non-roaming subscribers, the AMF chooses the RFSP Index in use according to one of the following procedures, depending on operator's configuration:

- the RFSP Index in use is identical to the subscribed RFSP Index, or

- the AMF chooses the RFSP Index in use based on the subscribed RFSP Index, the locally configured operator's policies, the Allowed NSSAI, and any Partially Allowed NSSAI and any Rejected S-NSSAIs partially in the RA, and the UE related context information available at the AMF, including UE's usage setting, if received during Registration procedures (see clause TS 23.502 [3]).

NOTE 1: One example of how the AMF can use the "UE's usage setting," is to select an RFSP value that enforces idle mode camping on E-UTRA for a UE acting in a "Voice centric" way, in the case voice over NR is not supported in the specific Registration Area and it contains NR cells.

The AMF may report to the PCF the subscribed RFSP Index received from the UDM for further evaluation as described in clause 6.1.2.1 of TS 23.503 [45]. When receiving the authorized RFSP Index from the PCF, the AMF shall apply the authorized RFSP Index instead of the subscribed RFSP Index for choosing the RFSP index in use (as described above). For roaming subscribers, the AMF may choose the RFSP Index in use based on the visited network policy, but can take input from the HPLMN into account (e.g. an RFSP Index value pre-configured per HPLMN, or a single RFSP Index value to be used for all roamers independent of the HPLMN).

NOTE 2: The PCF can provide validity time together with the authorized RFSP Index indicating a change in priority from 5G access to E-UTRAN access as specified in clause 5.17.2.2.

The RFSP Index in use is also forwarded from source to target NG-RAN node when Xn or N2 is used for intra-NG-RAN handover.

The AMF stores the subscribed RFSP Index value received and the RFSP Index value in use. During the Registration procedure, the AMF may update the RFSP Index value in use (e.g. the AMF may need to update the RFSP Index value in use if the UE related context information in the AMF has changed). When the RFSP Index value in use is changed, the AMF immediately provides the updated RFSP Index value in use to NG-RAN node by modifying an existing UE context or by establishing a new UE context in RAN or by being configured to include the updated RFSP Index value in use in the NGAP DOWNLINK NAS TRANSPORT message if the user plane establishment is not needed. During inter-AMF mobility procedures, the source AMF forwards both RFSP Index values to the target AMF. The target AMF may replace the received RFSP Index value in use with a new RFSP Index value in use that is based on the operator's policies and the UE related context information available at the target AMF.

In order to enable UE idle mode mobility control and priority-based reselection mechanism considering availability of Network Slices at the network and the Network Slices allowed for a UE, an RFSP is derived as described in clause 5.3.4.3, considering also the Allowed NSSAI, and any Partially Allowed NSSAI and any Rejected S-NSSAIs partially in the RA, for the UE.

A UE supporting NSAG (see clause 5.15.14) may be configured, for some of the S-NSSAIs in the configured NSSAI, with NSAGs it can use as described in TS 38.300 [27], TS 38.304 [50], TS 38.331 [28], TS 38.321 [143], TS 24.501 [47] and as described in clause 5.3.4.3.4.

Editor's Note: The AMF can provide the Partially Allowed NSSAI and the S-NSSAIs of the rejected S-NSSAI partially in the RA without indication of the TAs where these are supported to the NG-RAN (in addition to providing the Partially Allowed NSSAI to the UE), but this will be evaluated after feedback from RAN WG2 and RAN WG3 whether and how to use the Partially Allowed NSSAI in the NG-RAN.

**3rd CHANGE**

##### 5.3.4.3.4 Network Slice based cell reselection and Random Access

When one or more S-NSSAI(s) are associated with NSAG(s), the UE may perform Network Slice based cell reselection and Random Access as described in TS 38.300 [27], TS 38.304 [50], TS 38.331 [28], TS 38.321 [143] and TS 24.501 [47].

When providing NSAG Information to the UE, the AMF shall also provide the NSAG priority information for the NSAGs provided in the NSAG Information. The AMF determines the NSAG priority information based on configured local policy of the serving PLMN or SNPN.

NOTE 1: How the AMF assigns the NSAG priority information per UE is not specified but AMF can take into account information like e.g. UE MM capabilities, Subscribed S-NSSAIs and HPLMN.

NOTE 2: The AMF can assign same priority value for NSAGs provided in the NSAG Information.

If the UE has received NSAG Information from the AMF, the UE shall use the NSAG Information provided by the AMF for cell reselection and Random Access as described below. If the UE has not received any NSAG Information from the AMF, the UE shall not use Network Slice based cell reselection and Random Access at all.

The UE NAS provides to the UE AS the NSAG Information as received from the AMF and the S-NSSAIs in the Allowed NSSAI, any Partially Allowed NSSAI and any Rejected S-NSSAIs partially in the RA as input to cell reselection, except when the UE intends to register with a new set of S-NSSAIs with a Requested NSSAI different from the current Allowed NSSAI, any Partially Allowed NSSAI and any Rejected S-NSSAIs partially in the RA, in which case the UE NAS provides to the UE AS layer the NSAG Information as received from the AMF and the S-NSSAIs in the Requested NSSAI, and this may trigger a cell reselection, before sending the Registration Request including the new Requested NSSAI.

For Network Slice based Random Access, different Random Access resources may be assigned to different NSAG(s). The UE determines Random Access configuration among NSAGs that are published in SIB for Random Access and that are associated to the S-NSSAIs triggering the access. If the signalling transaction triggering the access attempt is related to more than one network slice, and the S-NSSAIs of these network slices are associated with more than one NSAG for Random Access, the NSAG with the highest priority is selected.

NOTE 3: How the UE NAS provides the NSAGs priorities to UE AS is based internal UE interface, and not specified.

**4th CHANGE**

5.4.4a UE MM Core Network Capability handling

The UE MM Core Network Capability is split into the S1 UE network capability (mostly for E-UTRAN access related core network parameters) and the UE 5GMM Core Network Capability (mostly to include other UE capabilities related to 5GCN or interworking with EPS) as defined in TS 24.501 [47] and contains non radio-related capabilities, e.g. the NAS security algorithms, etc. The S1 UE network capability is transferred between all CN nodes at AMF to AMF, AMF to MME, MME to MME, and MME to AMF changes. The UE 5GMM Core Network Capability is transferred only at AMF to AMF changes.

In order to ensure that the UE MM Core Network Capability information stored in the AMF is up to date (e.g. to handle the situation when the USIM is moved into a different device while out of coverage, and the old device did not send the Detach message; and the cases of inter-RAT Registration Area Update), the UE shall send the UE MM Core Network Capability information to the AMF during the Initial Registration and Mobility Registration Update procedure within the NAS message.

The AMF shall store always the latest UE MM Core Network Capability received from the UE. Any UE MM Core Network Capability that an AMF receives from an old AMF/MME is replaced when the UE provides the UE MM Core Network Capability with Registration signalling.

If the UE's UE MM Core Network Capability information changes (in either CM-CONNECTED or in CM-IDLE state), the UE shall perform a Mobility Registration Update procedure when it next returns to NG-RAN coverage. See clause 4.2.2 of TS 23.502 [3].

The UE shall indicate in the UE 5GMM Core Network Capability if the UE supports:

- Attach in EPC with Request type "Handover" in PDN CONNECTIVITY Request message (clause 5.3.2.1 of TS 23.401 [26]).

- EPC NAS.

- SMS over NAS.

- LCS.

- 5G SRVCC from NG-RAN to UTRAN, as specified in TS 23.216 [88].

- Radio Capabilities Signalling optimisation (RACS).

- Network Slice-Specific Authentication and Authorization.

- Parameters in Supported Network Behaviour for 5G CIoT as described in clause 5.31.2.

- Receiving WUS Assistance Information (E-UTRA) see clause 5.4.9..

- Paging Subgrouping Support Indication (NR) see clause 5.4.12.

- CAG, see clause 5.30.3.3.

- Subscription-based restrictions to simultaneous registration of network slices (see clause 5.15.12).

- Support of NSAG (see clause 5.15.14).

- Partial Network Slice support in a RA (see clause 5.15.X).

- Minimization of Service Interruption (MINT), as described in clause 5.40.

- Equivalent SNPNs (see clause 5.30.2.11).

- Unavailability Period, as described in clause 5.4.1.4.

If a UE operating two or more USIMs, supports and intends to use one or more Multi-USIM features (see clause 5.38) in a PLMN for a USIM, it shall indicate in the UE 5GMM Core Network Capability for this USIM in this PLMN that it supports these one or more Multi-USIM features with the following indications:

- Connection Release Supported.

- Paging Cause Indication for Voice Service Supported.

- Reject Paging Request Supported.

- Paging Restriction Supported.

Otherwise, the UE with the capabilities of Multi-USIM features but does not intend to use them shall not indicate support of these one or more Multi-USIM features.

A UE not operating two or more USIMs shall indicate the Multi-USIM features are not supported.

NOTE: It is not necessary for a UE operating two or more USIMs to use Multi-USIM features with all USIMs.

**Next CHANGE**

5.15 Network slicing

5.15.1 General

A Network Slice instance is defined within a PLMN or within an SNPN and shall include:

- the Core Network Control Plane and User Plane Network Functions, as described in clause 4.2,

and, in the serving PLMN, at least one of the following:

- the NG-RAN described in TS 38.300 [27];

- the N3IWF or TNGF functions to the non-3GPP Access Network described in clause 4.2.8.2 or the TWIF functions to the trusted WLAN in the case of support of N5CW devices described in clause 4.2.8.5;

- the W-AGF function to the Wireline Access Network described in clause 4.2.8.4.

The 5G System deployed in a PLMN shall always support the procedures, information and configurations specified to support Network Slice instance selection in the present document, TS 23.502 [3] and TS 23.503 [45].

Network slicing support for roaming is described in clause 5.15.6.

Network slices may differ for supported features and network functions optimisations, in which case such Network Slices may have e.g. different S-NSSAIs with different Slice/Service Types (see clause 5.15.2.1). The operator can deploy multiple Network Slices delivering exactly the same features but for different groups of UEs, e.g. as they deliver a different committed service and/or because they are dedicated to a customer, in which case such Network Slices may have e.g. different S-NSSAIs with the same Slice/Service Type but different Slice Differentiators (see clause 5.15.2.1).

The network may serve a single UE with one or more Network Slice instances simultaneously via a 5G-AN regardless of the access type(s) over which the UE is registered (i.e. 3GPP Access and/or N3GPP Access). The AMF instance serving the UE logically belongs to each of the Network Slice instances serving the UE, i.e. this AMF instance is common to the Network Slice instances serving a UE.

NOTE 1: Number of simultaneous connection of Network Slice instances per UE is limited by the number of S-NSSAIs in the Requested/Allowed NSSAI as described in clause 5.15.2.1.

NOTE 2: In this Release of the specification it is assumed that in any (home or visited) PLMN it is always possible to select an AMF that can serve any combination of S-NSSAIs that will be provided as an Allowed NSSAI.

The selection of the set of Network Slice instances for a UE is triggered by the first contacted AMF in a Registration procedure normally by interacting with the NSSF, and can lead to a change of AMF. This is further described in clause 5.15.5.

A PDU Session belongs to one and only one specific Network Slice instance per PLMN. Different Network Slice instances do not share a PDU Session, though different Network Slice instances may have slice-specific PDU Sessions using the same DNN.

During the Handover procedure the source AMF selects a target AMF by interacting with the NRF as specified in clause 6.3.5.

Network Slice-Specific Authentication and Authorization (NSSAA) enables Network Slice specific authentication as described in clause 5.15.10.

Network Slice Admission Control (NSAC) controls the number of registered UEs per network slice and the number of PDU Sessions per network slice as described in clause 5.15.11.

Support of subscription-based restrictions to simultaneous registration of network slices uses Network Slice Simultaneous Registration Group (NSSRG) information to enable control of which Network Slices that can be registered simultaneously by a UE as described in clause 5.15.12.

Support of data rate limitation per Network Slice for a UE enables enforcement of Maximum Bit Rate per Network Slice for a UE as described in clause 5.15.13.

The selection of N3IWF supporting a set of slice(s) is described in clause 6.3.6.

The Partial Network Slice support in a Registration Area is described in clause 15.5.X.

**Next CHANGE**

5.15.4 UE NSSAI configuration and NSSAI storage aspects

5.15.4.1 General

5.15.4.1.1 UE Network Slice configuration

The Network Slice configuration information contains one or more Configured NSSAI(s). A Configured NSSAI may either be configured by a Serving PLMN and apply to the Serving PLMN, or may be a Default Configured NSSAI configured by the HPLMN and that applies to any PLMNs for which no specific Configured NSSAI has been provided to the UE. There is at most one Configured NSSAI per PLMN.

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

The Default Configured NSSAI, if it is configured in the UE, is used by the UE in a Serving PLMN only if the UE has no Configured NSSAI for the Serving PLMN.

The Configured NSSAI of a PLMN may include S-NSSAIs that have standard values or PLMN-specific values.

The Configured NSSAI for the Serving PLMN includes the S-NSSAI values which can be used in the Serving PLMN and may be associated with mapping of each S-NSSAI of the Configured NSSAI to one or more corresponding HPLMN S-NSSAI values. In the non-roaming case, the network shall not provide any mapped S-NSSAI to the UE with the Configured NSSAI.

A UE subscription may contain Network Slice Simultaneous Registration Group (NSSRG) information. If so, the UE configuration is performed as described in clause 5.15.12.2.

The UE may be pre-configured with the Default Configured NSSAI. The UE may be provisioned/updated with the Default Configured NSSAI, determined by the UDM in the HPLMN, using the UE Parameters Update via UDM Control Plane procedure defined in clause 4.20 of TS 23.502 [3]. Each S-NSSAI in the Default Configured NSSAI may have a corresponding S-NSSAI as part of the Subscribed S-NSSAI(s). Consequently, if the Subscribed S-NSSAI(s) which are also present in the Default Configured NSSAI are updated the UDM should update the Default Configured NSSAI in the UE.

In the HPLMN, the S-NSSAIs in the Configured NSSAI provided as described in clause 5.15.4.2, at the time when they are provided to the UE, shall match the Subscribed S-NSSAIs for the UE. When the Subscribed S-NSSAI(s) are updated (i.e. some existing S-NSSAIs are removed and/or some new S-NSSAIs are added) and one or more are applicable to the Serving PLMN the UE is registered in, as described in clause 5.15.3, or when the associated mapping is updated the AMF shall update the UE with the Configured NSSAI for the Serving PLMN and/or Allowed NSSAI and Partially Allowed NSSAI and/or the associated mapping to HPLMN S-NSSAIs (see clause 5.15.4.2). When there is the need to update the Allowed NSSAI or Partially Allowed NSSAI, the AMF shall provide the UE with the new Allowed NSSAI or Partially Allowed NSSAI and the associated mapping to HPLMN S-NSSAIs, unless the AMF cannot determine the new Allowed NSSAI (e.g. all S-NSSAIs in the old Allowed NSSAI have been removed from the Subscribed S-NSSAIs), in which case the AMF shall not send any Allowed NSSAI to the UE but indicate to the UE to perform a Registration procedure. If the UE is in a CM-IDLE state, the AMF may trigger Network Triggered Service Request or wait until the UE is in a CM-CONNECTED state as described in clause 4.2.4.2, TS 23.502 [3].

When providing a Requested NSSAI to the network upon registration, the UE in a given PLMN only includes and uses S-NSSAIs applying to this PLMN. The mapping of S-NSSAIs of the Requested NSSAI to HPLMN S-NSSAIs may also be provided (see clause 5.15.4.1.2 for when this is needed). The S-NSSAIs in the Requested NSSAI are part of the Configured and/or Allowed NSSAIs applicable for this PLMN, when they are available. If the UE has received NSSRG information together with the Configured NSSAI, it only includes in the Requested NSSAI S-NSSAIs that all share a common NSSRG. If the UE has stored Pending NSSAI and the UE is still interested in the Pending NSSAI then all the S-NSSAIs in the Requested NSSAI and the Pending S-NSSAI shall share a common NSSRG. If no Configured NSSAI and Allowed NSSAI for the PLMN are available, the S-NSSAIs in the Requested NSSAI correspond to the Default Configured NSSAI, if configured in the UE. Upon successful completion of a UE's Registration procedure over an Access Type, the UE obtains from the AMF an Allowed NSSAI or Partially Allowed NSSAI for this Access Type, which includes one or more S-NSSAIs and, if needed (see clause 5.15.4.1.2 for when this is needed), their mapping to the HPLMN S-NSSAIs. These S-NSSAIs are valid for the current Registration Area and Access Type provided by the AMF the UE has registered with and can be used simultaneously by the UE (up to the maximum number of simultaneous Network Slice instances or PDU Sessions).

The UE might also obtain one or more rejected S-NSSAIs with cause and validity of rejection from the AMF. An S-NSSAI may be rejected:

- for the entire PLMN;

- for the current Registration Area; or

- partially in the current Registration Area. Such partially rejected S-NSSAI in the current Registration area is associated with a list of TAs where the S-NSSAI is supported.

While the UE remains RM-REGISTERED in the PLMN and regardless of the Access Type, the UE shall not re-attempt to register to an S-NSSAI rejected for the entire PLMN until this rejected S-NSSAI is deleted as specified below.

While the UE remains RM-REGISTERED in the PLMN, the UE shall not re-attempt to register to an S-NSSAI rejected in the current Registration Area until it moves out of the current Registration Area.

While the UE remains RM-REGISTERED in the PLMN, the UE shall not re-attempt to register to an S-NSSAI rejected partially in the RA until the UE moves into a TA which is in the list of TAs supporting the S-NSSAI.

NOTE 2: The details and more cases of S-NSSAI rejection are described in TS 24.501 [47].

S-NSSAIs that the UE provides in the Requested NSSAI which are neither in the Allowed NSSAI nor in the Partially Allowed NSSAI, nor provided as a rejected S-NSSAI, shall, by the UE, not be regarded as rejected, i.e. the UE may request to register these S-NSSAIs again next time the UE sends a Requested NSSAI.

The UE stores (S-)NSSAIs as follows:

- When provisioned with a Configured NSSAI for a PLMN and/or a mapping of Configured NSSAI to HPLMN S-NSSAIs and possibly NSSRG information for each S-NSSAI in the Configured NSSAI (if applicable and supported by the UE), or when requested to remove the configuration due to network slicing subscription change, the UE shall:

- replace any stored (old) Configured NSSAI for this PLMN with the new Configured NSSAI for this PLMN (if applicable); and

- delete any stored associated mapping of this old Configured NSSAI for this PLMN to HPLMN S-NSSAIs and, if present and applicable, store the mapping of Configured NSSAI to HPLMN S-NSSAIs; and

- delete any stored associated NSSRG information for each S-NSSAI of the Configured NSSAI and, if present, store the associated NSSRG information for each S-NSSAI of the Configured NSSAI; and

- delete any stored rejected S-NSSAI for this PLMN;

- keep the received Configured NSSAI for a PLMN (if applicable) and associated mapping to HPLMN S-NSSAIs (if applicable) and associated NSSRG information for each S-NSSAI of the Configured NSSAI (if applicable and supported by the UE) stored in the UE, even when registering in another PLMN, until a new Configured NSSAI for this PLMN and/or associated mapping are provisioned in the UE, or until the network slicing subscription changes, as described in clause 5.15.4.2. The number of Configured NSSAIs and associated mapping to be kept stored in the UE for PLMNs other than the HPLMN is up to UE implementation. A UE shall at least be capable of storing a Configured NSSAI for the serving PLMN including any necessary mapping of the Configured NSSAI for the Serving PLMN to HPLMN S-NSSAIs and the Default Configured NSSAI.

- The Allowed NSSAI received in a Registration Accept message or a UE Configuration Update Command applies to a PLMN when at least a TAI of this PLMN is included in the RA/TAI list included in this Registration Accept message or UE Configuration Update Command. If the UE Configuration Update Command contains an Allowed NSSAI but not a TAI List, then the last received RA/TAI list applies for the decision on which PLMN(s) the Allowed NSSAI is applicable. If received, the Allowed NSSAI for a PLMN and Access Type and any associated mapping of this Allowed NSSAI to HPLMN S-NSSAIs shall be stored in the UE. The UE should store this Allowed NSSAI and any associated mapping of this Allowed NSSAI to HPLMN S-NSSAIs also when the UE is turned off, or until the network slicing subscription changes, as described in clause 5.15.4.2:

NOTE 3: Whether the UE stores the Allowed NSSAI and any associated mapping of the Allowed NSSAI to HPLMN S-NSSAIs also when the UE is turned off is left to UE implementation.

- When a new Allowed NSSAI for a PLMN and any associated mapping of the Allowed NSSAI to HPLMN S-NSSAIs are received over an Access Type, the UE shall:

- replace any stored (old) Allowed NSSAI and any associated mapping for these PLMN and Access Type with this new Allowed NSSAI; and

- delete any stored associated mapping of this old Allowed NSSAI for this PLMN to HPLMN S-NSSAIs and, if present, store the associated mapping of this new Allowed NSSAI to HPLMN S-NSSAIs;

- If received, a Partially Allowed NSSAI received in a Registration Accept message or a UE Configuration Update Command message applies to the current Registration Area. The UE stores the Partially Allowed NSSAI in the same way as described for the Allowed NSSAI (see also clause 5.15.X).

- If received, an S-NSSAI rejected for the entire PLMN shall be stored in the UE while RM-REGISTERED in this PLMN regardless of the Access Type or until it is deleted.

- If received, an S-NSSAI rejected for the current Registration Area shall be stored in the UE while RM-REGISTERED until the UE moves out of the current Registration Area or until the S-NSSAI is deleted.

- If received, an S-NSSAI rejected partially in the RA shall be stored in the UE while RM-REGISTERED until the UE moves out of the current Registration Area or until the S-NSSAI is deleted (see also clause 5.15.X).

NOTE 4: The storage aspects of rejected S-NSSAIs are described in TS 24.501 [47].

- If received, the Pending NSSAI shall be stored in the UE as described in TS 24.501 [47].

UE configuration to guide UE selection of a N3IWF that supports the S-NSSAIs needed by the UE is defined in clause 6.3.6.

5.15.4.1.2 Mapping of S-NSSAIs values in the Allowed NSSAI and in the Requested NSSAI to the S-NSSAIs values used in the HPLMN

One or more S-NSSAIs in an Allowed NSSAI provided to the UE can have values which are not part of the UE's current Network Slice configuration information for the Serving PLMN. In this case, the network provides the Allowed NSSAI together with the mapping of each S-NSSAI of the Allowed NSSAI to the corresponding S-NSSAI of the HPLMN. This mapping information allows the UE to associate Applications to S-NSSAIs of the HPLMN as per NSSP of the URSP rules or as per the UE Local Configuration (if available), as defined in clause 6.1.2.2.1 of TS 23.503 [45] and to the corresponding S-NSSAI from the Allowed NSSAI.

In the non-roaming case, the network shall not provide any mapped S-NSSAI to the UE with the Allowed NSSAI.

In roaming case, the UE shall provide in the Requested NSSAI the mapping of S-NSSAIs of the Serving PLMN values to the corresponding S-NSSAI values of the HPLMN, for each S-NSSAI in the Requested NSSAI for which a mapping is available. These values are found in the mapping previously received from the Serving PLMN of the S-NSSAIs of the Configured NSSAI for the Serving PLMN or of the S-NSSAIs of the Allowed NSSAI for the Serving PLMN and Access Type to the corresponding S-NSSAIs values used in the HPLMN.

If the AMF provides Partially Allowed NSSAI to the UE, in roaming case the AMF may provide the mapping information of each S-NSSAI of the Partially Allowed NSSAI to the corresponding HPLMN S-NSSAI as described in clause 5.15.X.

**Next CHANGE**

### 5.15.X Partial Network Slice support in a Registration Area

A Network Slice may be supported in one or more TAs in a PLMN/SNPN.

When creating a Registration Area for UEs supporting the Partial Network Slice support in a Registration Area, the AMF may consider the trade-off between signalling for paging in TAs where the S-NSSAI is not supported versus the signalling for Mobility Registration Updates to register with the S-NSSAI in the TA(s) where the S-NSSAI is supported, so that the AMF may create a Registration Area including the TA(s) where a requested S-NSSAI is not supported. Such S-NSSAI:

- If it was requested by the UE from a cell in a TA where the S-NSSAI is not supported, it is included either in the Partially Allowed NSSAI or the AMF rejects the S-NSSAI partially in the RA.

- If it was requested by the UE from a cell in a TA where the S-NSSAI is supported, it is included in the Partially Allowed NSSAI

If the AMF, for a certain S-NSSAI that is supported in the cell where the S-NSSAI was requested in the Registration Request and therefore S-NSSAI can be allowed for the UE in the current TA, requires (e.g. due to NSAC on the number of registered UEs or other reasons) that the UE is deregistered from the S-NSSAI as soon as it exits the area where the S-NSSAI is supported, then the AMF restricts the RA so the S-NSSAI is supported in all the TAs of the RA and includes the S-NSSAI in the Allowed NSSAI.

Whether the AMF for supporting UEs uses the Partially Allowed NSSAI or rejects the S-NSSAIs partially in the RA is a per S-NSSAI decision which is based on AMF local policy. If supported and allowed by local policy, the Partially Allowed NSSAI and S-NSSAIs rejected partially in the RA may be applied simultaneously for one UE for different S-NSSAIs.

While the S-NSSAIs of the Allowed NSSAI are supported in all the TAs of the Registration Area, the S-NSSAIs of the Partially Allowed NSSAI are supported only in the TAs corresponding to the list of TAs (which are subset of the list of TAIs forming the Registration Area) associated with the S-NSSAI.

If the network supports for some S-NSSAIs AoS that is smaller than the TA, the handling is specified in clause 5.15.y

If the UE support Partial Network Slice support in a Registration Area, the AMF provides to the UE in the Registration Accept message or in the UE Configuration Update Command message the Partially Allowed NSSAI or the S-NSSAIs rejected partially in the RA as follows:

- The AMF may create a Registration Area for the UE considering the support of the S-NSSAIs of the Requested NSSAI in the current TA and in the neighbouring TAs.

- If one or more of the requested S-NSSAI(s) are supported in a subset of the TAs of the (potential) Registration Area, the AMF may include such S-NSSAI(s) in the Partially Allowed NSSAI and corresponding mapping information of the S-NSSAI(s) of the Partially Allowed NSSAI to the HPLMN S-NSSAI(s). For each S-NSSAI of the Partially Allowed NSSAI the AMF provides a list of TAs where the S-NSSAI is supported. The UE is considered registered with the S-NSSAI in the whole Registration area. The AMF also provides the Partially Allowed NSSAI (without indication of the TA list where the partially allowed S-NSSAIs are supported) to the NG-RAN together with the UE's context.

- Alternatively, the AMF may reject the S-NSSAI(s) with reject cause indicating "partially in the RA". For each S-NSSAI of the S-NSSAIs rejected partially in the RA the AMF provides a list of TAs for which the S-NSSAI is rejected.

NOTE: If the UE requests a S-NSSAI in a cell of a TA where the S-NSSAI is supported, the AMF cannot indicate the S-NSSAI as rejected partially in the RA unless it considers the UE in a cell where it is allocated zero resource and the AMF policy is to not allow the S-NSSAI where zero resources are allocated to the S-NSSAI.

When the UE stores Partially Allowed NSSAI the following applies:

- the UE is considered registered with an S-NSSAI of the Partially Allowed NSSAI in the whole Registration area,.

- The UE is allowed to initiate PDU Session establishment for the S-NSSAI only when the UE is in a TA part of the list of TAIs associated with each S-NSSAI.

- When the UE has already established a PDU Session with an S-NSSAI part of the Partially Allowed NSSAI, the UE is allowed to activate the User Plane Resources of the PDU Session only when the UE is in a TA part of the list of TAs associated with each S-NSSAI.

- When the User Plane Resources are activated for a PDU Session to an S-NSSAI part of the Partially Allowed NSSAI and the UE moves to a TA which is not part of the list of TAs associated with the S-NSSAI, the User Plane Resources for the PDU Session shall be deactivated, but the PDU Session context in UE and SMF is not released. The User Plane Resources for the PDU Session shall not be activated as long as the UE is located in a TA which is not part of the list of TAs associated with the S-NSSAI of the Partially Allowed NSSAI.

Editor's note: this is for further study.

When the UE stores a S-NSSAI rejected partially in the RA with the associated list of TAs, the UE is allowed to initiate a Mobility Registration Update procedure to request registration with the S-NSSAI only when the UE is in TAs not part of the stored list of TAs associated with this S-NSSAI.

**Next CHANGE**

6.2.1 AMF

The Access and Mobility Management function (AMF) includes the following functionality. Some or all of the AMF functionalities may be supported in a single instance of an AMF:

- Termination of RAN CP interface (N2).

- Termination of NAS (N1), NAS ciphering and integrity protection.

- Registration management.

- Connection management.

- Reachability management.

- Mobility Management.

- Lawful intercept (for AMF events and interface to LI System).

- Provide transport for SM messages between UE and SMF.

- Transparent proxy for routing SM messages.

- Access Authentication.

- Access Authorization.

- Provide transport for SMS messages between UE and SMSF.

- Security Anchor Functionality (SEAF) as specified in TS 33.501 [29].

- Location Services management for regulatory services.

- Provide transport for Location Services messages between UE and LMF as well as between RAN and LMF.

- EPS Bearer ID allocation for interworking with EPS.

- UE mobility event notification.

- S-NSSAIs per TA mapping notification.

- Support for Control Plane CIoT 5GS Optimisation.

- Support for User Plane CIoT 5GS Optimisation.

- Support for restriction of use of Enhanced Coverage.

- Provisioning of external parameters (Expected UE Behaviour parameters or Network Configuration parameters).

- Support for Network Slice-Specific Authentication and Authorization.

- Support for charging.

- Controlling the 5G access stratum-based time distribution based on UE's subscription data.

NOTE 1: Regardless of the number of Network functions, there is only one NAS interface instance per access network between the UE and the CN, terminated at one of the Network functions that implements at least NAS security and Mobility Management.

In addition to the functionalities of the AMF described above, the AMF may include the following functionality to support non-3GPP access networks:

- Support of N2 interface with N3IWF/TNGF. Over this interface, some information (e.g. 3GPP Cell Identification) and procedures (e.g. Handover related) defined over 3GPP access may not apply, and non-3GPP access specific information may be applied that do not apply to 3GPP accesses.

- Support of NAS signalling with a UE over N3IWF/TNGF. Some procedures supported by NAS signalling over 3GPP access may be not applicable to untrusted non-3GPP (e.g. Paging) access.

- Support of authentication of UEs connected over N3IWF/TNGF.

- Management of mobility, authentication, and separate security context state(s) of a UE connected via a non-3GPP access or connected via a 3GPP access and a non-3GPP access simultaneously.

- Support as described in clause 5.3.2.3 a co-ordinated RM management context valid over a 3GPP access and a Non 3GPP access.

- Support as described in clause 5.3.3.4 dedicated CM management contexts for the UE for connectivity over non-3GPP access.

- Determine whether the serving N3IWF is appropriate based on the slices supported by the N3IWFs as specified in clause 6.3.6.

NOTE 2: Not all of the functionalities are required to be supported in an instance of a Network Slice.

In addition to the functionalities of the AMF described above, the AMF may include policy related functionalities as described in clause 6.2.8 of TS 23.503 [45].

The AMF uses the N14 interface for AMF re-allocation and AMF to AMF information transfer. This interface may be either intra-PLMN or inter-PLMN (e.g. in the case of inter-PLMN mobility).

In addition to the functionality of the AMF described above, the AMF may include the following functionality to support monitoring in roaming scenarios:

- Normalization of reports according to roaming agreements between VPLMN and HPLMN (e.g. change the location granularity in a report from cell level to a level that is appropriate for the HPLMN); and

- Generation of charging/accounting information for Monitoring Event Reports that are sent to the HPLMN.

In addition to the functionality of the AMF described above, the AMF may provide support for Network Slice restriction and Network Slice instance restriction based on NWDAF analytics.

In addition to the functionalities of the AMF described above, the AMF may provide support for the Disaster Roaming as described in clause 5.40.

In addition to the functionalities of the AMF described above, the AMF may also include following functionalities to support Network Slice Admission Control:

- Support of NSAC for maximum number of UEs as defined in clauses 5.15.11.1 and 5.15.11.3.

In addition to the functionality of the AMF described above, the AMF may include the following functionality to support SNPNs:

- Support for Onboarding of UEs for SNPNs.

In addition to the functionalities of the AMF described above, the AMF may also include following functionalities to support satellite backhaul:

- Support for reporting satellite backhaul category (i.e. GEO, MEO, LEO or OTHERSAT) and its modification based on AMF local configuration to SMF as defined in clause 5.8.2.15.

In addition to the functionalities of the AMF described above, the AMF may also support functionalities for Partial Network Slice support in a Registration Area as described in clause 5.15.X.

\* \* \* END of CHANGES \* \* \*