**SA WG2 Meeting #143e S2-2100067**

**Feb 24th – March 9th, 2021 ; Elbonia (revision of S2-2002040)**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.501** | **CR** | **2525** | **rev** | **-** | **Current version:** | **16.7.0** |  |
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| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Support of different slices over different Non 3GPP access | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | S2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI17\_N3SLICE | | | | |  | ***Date:*** | | | 2021-01-18 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | *Rel-17* |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories 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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Per Current 3GPP specifications,   * the AMF receives from the 5G AN (in N3GPP case: N3IWF / TNGF / W-AGF) information on the slices (S-NSSAI) supported by the 5G AN TA(s). This is done as part of NG set up request (38.413)  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | >>>>TAI Slice Support List | M |  | Slice Support List  9.3.1.17 | **Supported S-NSSAIs per TA**. | - |  |  * **all the 5G AN (N3IWF / TNGF / W-AGF) correspond to the same unique TA**   This mean that **support of slices has to be homogeneous between (Un)trusted Non 3GPP access (N3IWF/TNGF) and wireline access** (W-AGF) as well as between different **wireline** AN of a PLMN;  This looks like an un-necessary restriction.  The corresponding WID is in SP-200456 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Support the possibility for operators to allocate a TAI per non 3GPP 5G AN (e.g. N3IWF / TNGF / W-AGF) : each non 3GPP access gateway is locally configured with its own TAI and the slices it supports. The TAI value is provided (as in case of 3GPP access) to AMF over N2 in NG SET UP message. There is one TAI value per non 3GPP access gateway.  Different non 3GPP access gateways (e.g. different N3IWF / TNGF / W-AGF) can thus advertise different TAI values, and can support different slices.  As TAI values are not advertised over Non 3GPP access, UE(s) do not need to be aware of the fact that different non 3GPP access gateways may correspond to a different TAI beyond the fact that they (UE) may receive different TAI values within the TAI list sent by the network over successive registration over non 3GPP access. | | | | | | | | |
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| ***Consequences if not approved:*** | | Support of slices has to be homogeneous between (Un)trusted Non 3GPP access (N3IWF/TNGF) and wireline access (W-AGF) as well as between different wireline AN of a PLMN. | | | | | | | | |
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| ***Clauses affected:*** | | 5.3.2.3 ; 5.15.5.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 23.502 CR | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*FIRST CHANGE*

#### 5.3.2.3 Registration Area management

Registration Area management comprises the functions to allocate and reallocate a Registration area to a UE. Registration area is managed per access type i.e., 3GPP access or Non-3GPP access.

When a UE registers with the network over the 3GPP access, the AMF allocates a set of tracking areas in TAI List to the UE. When the AMF allocates registration area, i.e. the set of tracking areas in TAI List, to the UE it may take into account various information (e.g. Mobility Pattern and Allowed/Non-Allowed Area (refer to clause 5.3.4.1)). An AMF which has the whole PLMN as serving area may alternatively allocate the whole PLMN ("all PLMN") as registration area to a UE in MICO mode (refer to clause 5.4.1.3).

The 5G System shall support allocating a Registration Area using a single TAI List which includes tracking areas of any NG-RAN nodes in the Registration Area for a UE.

TAI(s) dedicated to Non-3GPP access may be defined in a PLMN and apply within thisPLMN: each Non-3GPP 5G AN (e.g. N3IWF / TNGF / W-AGF) is locally configured with its own (one) TAI whose value is provided (as in case of 3GPP access) to the AMF as part of the N2 Configuration procedure (see 23.502 [2] clause 4.2.7.1).

When a UE registers with the network over a Non-3GPP access, the AMF allocates to the UE a registration area that only includes the TAI corresponding to the Non-3GPP 5G AN (e.g. N3IWF / TNGF / W-AGF) via which the UE registers to the 5GC. . This TAI corresponds to the value indicated by the Non-3GPP 5G AN as part of the N2 Configuration procedure.

Different Non-3GPP 5G AN(s) supporting the same kind of access (e.g. different W-AGF(s)) may correspond to a different TAI (e.g. different W-AGF(s) may correspond to different set of slices);

NOTE 0: Different Non-3GPP 5G AN(s) can thus support different sets of S-NSSAI(s).

When generating the TAI list, the AMF shall include only TAIs that are applicable on the access type (i.e. 3GPP access or Non-3GPP access) where the TAI list is sent.

NOTE 1: To prevent extra signalling load resulting from Mobility Registration Update occurring at every RAT change, it is preferable to avoid generating a RAT-specific TAI list for a UE supporting more than one RAT.

For all 3GPP Access RATs in NG-RAN and for Non-3GPP Access, the 5G System supports the TAI format as specified in TS 23.003 [19] consisting of MCC, MNC and a 3-byte TAC only.

The additional aspects for registration management when a UE is registered over one access type while the UE is already registered over the other access type is further described in clause 5.3.2.4.

To ensure a UE initiates a Mobility Registration procedure when performing inter-RAT mobility to or from NB-IoT, a Tracking Area shall not contain both NB-IoT and other RATs cells (e.g. WB-E-UTRA, NR), and the AMF shall not allocate a TAI list that contains both NB-IoT and other RATs Tracking Areas.

For 3GPP access the AMF determines the RAT type the UE is camping on based on the Global RAN Node IDs associated with the N2 interface and additionally the Tracking Area indicated by NG-RAN. When the UE is accessing NR using unlicensed bands, as defined in clause 5.4.8, an indication is provided in N2 interface as defined in TS 38.413 [34].

The AMF may also determine more precise RAT Type information based on further information received from NG-RAN:

- The AMF may determine the RAT Type to be LTE-M as defined in clause 5.31.20; or

- The AMF may determine the RAT Type to be NR using unlicensed bands, as defined in clause 5.4.8.

For Non-3GPP accesses the AMF determines the RAT type the UE is camping based on the 5G-AN node associated with N2 interface as follows:

- The RAT type is Untrusted Non-3GPP if the 5G-AN node has a Global N3IWF Node ID;

- The RAT type is Trusted Non-3GPP if the 5G-AN node has a Global TNGF Node ID or a Global TWIF Node ID; and

- The RAT type is Wireline -BBF if the 5G-AN node has a Global W-AGF Node ID corresponding to a W-AGF supporting the Wireline BBF Access Network. The RAT type is Wireline-Cable if the 5G-AN node has a Global W-AGF Node ID corresponding to a W-AGF supporting the Wireline Cable Access Network. If not possible to distinguish between the two, the RAT type is Wireline.

NOTE 2: How to differentiate between W-AGF supporting either Wireline BBF Access Network or the Wireline (e.g. different Global W-AGF Node ID IE or the Global W-AGF Node ID including a field to distinguish between them) is left to Stage 3 definition.

NOTE 3: If an operator supports only one kind of Wireline Access Network (either Wireline BBF Access Network or a Wireline Cable Access Network) the AMF may be configured to use RAT type Wireline or the specific one.

For Non-3GPP access the AMF may also use the User Location Information provided at N2 connection setup to determine a more precise RAT Type, e.g. identifying IEEE 802.11 access, Wireline-Cable access, Wireline-BBF access.

When the 5G-AN node has either a Global N3IWF Node ID, or a Global TNGF Node ID, or a Global TWIF Node ID, or a Global W-AGF Node ID, the Access Type is Non-3GPP Access.

*NEXT CHANGE (2)*

##### 5.15.5.2.1 Registration to a set of Network Slices

When a UE registers over an Access Type with a PLMN, if the UE has either or both of:

- a Configured NSSAI for this PLMN;

- an Allowed NSSAI for this PLMN and Access Type;

the UE shall provide to the network, in AS layer under the conditions described in clause 5.15.9 and in NAS layer, a Requested NSSAI containing the S-NSSAI(s) corresponding to the Network Slice(s) to which the UE wishes to register, unless they are stored in the UE in the Pending NSSAI.

The Requested NSSAI shall be one of:

- the Default Configured NSSAI, i.e. if the UE has no Configured NSSAI nor an Allowed NSSAI for the serving PLMN;

- the Configured-NSSAI, or a subset thereof as described below, e.g. if the UE has no Allowed NSSAI for the Access Type for the serving PLMN;

- the Allowed-NSSAI for the Access Type over which the Requested NSSAI is sent, or a subset thereof; or

- the Allowed-NSSAI for the Access Type over which the Requested NSSAI is sent, or a subset thereof, plus one or more S-NSSAIs from the Configured-NSSAI not yet in the Allowed NSSAI for the Access Type as described below.

NOTE 1: If the UE wishes to register only a subset of the S-NSSAIs from the Configured NSSAI or the Allowed NSSAI, to be able to register with some Network Slices e.g. to establish PDU Sessions for some application(s), and the UE uses the URSP rules (which includes the NSSP) or the UE Local Configuration as defined in clause 6.1.2.2.1 of TS 23.503 [45], then the UE uses applicable the URSP rules or the UE Local Configuration to ensure that the S-NSSAIs included in the Requested NSSAI are not in conflict with the URSP rules or with the UE Local Configuration.

The subset of S-NSSAIs in the Configured-NSSAI provided in the Requested NSSAI consists of one or more S-NSSAI(s) in the Configured NSSAI applicable to this PLMN, if one is present, and for which no corresponding S-NSSAI is already present in the Allowed NSSAI for the access type for this PLMN. The UE shall not include in the Requested NSSAI any S-NSSAI that is currently rejected by the network (i.e. rejected in the current registration area or rejected in the PLMN). For the registration to a PLMN for which neither a Configured NSSAI applicable to this PLMN or an Allowed NSSAI are present, the S-NSSAIs provided in the Requested NSSAI correspond to the S-NSSAI(s) in the Default Configured NSSAI unless the UE has HPLMN S-NSSAI for established PDU Session(s) in which case the HPLMN S-NSSAI(s) shall be provided in the mapping of Requested NSSAI in the NAS Registration Request message, with no corresponding VPLMN S-NSSAI in the Requested NSSAI.

When a UE registers over an Access Type with a PLMN, the UE shall also indicate in the Registration Request message when the Requested NSSAI is based on the Default Configured NSSAI.

The UE shall include the Requested NSSAI in the RRC Connection Establishment and in the establishment of the connection to the N3IWF/TNGF (as applicable) and in the NAS Registration procedure messages subject to conditions set out in clause 5.15.9. However, the UE shall not indicate any NSSAI in RRC Connection Establishment or Initial NAS message unless it has either a Configured NSSAI for the corresponding PLMN, an Allowed NSSAI for the corresponding PLMN and Access Type, or the Default Configured NSSAI. If the UE has HPLMN S-NSSAI(s) for established PDU Session(s), the HPLMN S-NSSAI(s) shall be provided in the mapping of Requested NSSAI in the NAS Registration Request message, independent of whether the UE has the corresponding VPLMN S-NSSAI. The (R)AN shall route the NAS signalling between this UE and an AMF selected using the Requested NSSAI obtained during RRC Connection Establishment or connection to N3IWF/TNGF respectively. If the (R)AN is unable to select an AMF based on the Requested NSSAI, it routes the NAS signalling to an AMF from a set of default AMFs. In the NAS signalling, if available, the UE provides the mapping of each S-NSSAI of the Requested NSSAI to a corresponding HPLMN S-NSSAI.

When a UE registers with a PLMN, if for this PLMN the UE has not included a Requested NSSAI nor a GUAMI while establishing the connection to the (R)AN, the (R)AN shall route all NAS signalling from/to this UE to/from a default AMF. When receiving from the UE a Requested NSSAI and a 5G-S-TMSI or a GUAMI in RRC Connection Establishment or in the establishment of connection to N3IWF/TNGF, if the 5G-AN can reach an AMF corresponding to the 5G-S-TMSI or GUAMI, then 5G-AN forwards the request to this AMF. Otherwise, the 5G-AN selects a suitable AMF based on the Requested NSSAI provided by the UE and forwards the request to the selected AMF. If the 5G-AN is not able to select an AMF based on the Requested NSSAI, then the request is sent to a default AMF.

When the AMF selected by the AN during Registration Procedure receives the UE Registration request, or after an AMF selection by MME (i.e. during EPS to 5GS handover) the AMF receives S-NSSAI(s) from SMF+PGW-C in 5GC:

- As part of the Registration procedure described in TS 23.502 [3], clause 4.2.2.2.2, or as part of the EPS to 5GS handover using N26 interface procedure described in clause 4.11.1.2.2 in TS 23.502 [3], the AMF may query the UDM to retrieve UE subscription information including the Subscribed S-NSSAIs.

- The AMF verifies whether the S-NSSAI(s) in the Requested NSSAI or the S-NSSAI(s) received from SMF+PGW-C are permitted based on the Subscribed S-NSSAIs (to identify the Subscribed S-NSSAIs the AMF may use the mapping to HPLMN S-NSSAIs provided by the UE, in the NAS message, for each S-NSSAI of the Requested NSSAI).

- When the UE context in the AMF does not yet include an Allowed NSSAI for the corresponding Access Type, the AMF queries the NSSF (see (B) below for subsequent handling), except in the case when, based on configuration in this AMF, the AMF is allowed to determine whether it can serve the UE (see (A) below for subsequent handling). The IP address or FQDN of the NSSF is locally configured in the AMF.

NOTE 2: The configuration in the AMF depends on operator's policy.

- When the UE context in the AMF already includes an Allowed NSSAI for the corresponding Access Type, based on the configuration for this AMF, the AMF may be allowed to determine whether it can serve the UE (see (A) below for subsequent handling).

NOTE 3: The configuration in the AMF depends on the operator's policy.

**(A)** Depending on fulfilling the configuration as described above, the AMF may be allowed to determine whether it can serve the UE, and the following is performed:

- For the mobility from EPS to 5GS, the AMF first derives the serving PLMN value(s) of S-NSSAI(s) based on the HPLMN S-NSSAI(s) in the mapping of Requested NSSAI (in CM-IDLE state) or the HPLMN S-NSSAI(s) received from SMF+PGW-C (in CM-CONNECTED state). After that the AMF regards the derived value(s) as the Requested NSSAI.

- For the inter PLMN within 5GC mobility, the new AMF derives the serving PLMN value(s) of S-NSSAI(s) based on the HPLMN S-NSSAI(s) in the mapping of Requested NSSAI. After that the AMF regards the derived value(s) as the Requested NSSAI.

- AMF checks whether it can serve all the S-NSSAI(s) from the Requested NSSAI present in the Subscribed S-NSSAIs (potentially using configuration for mapping S-NSSAI values between HPLMN and Serving PLMN), or all the S-NSSAI(s) marked as default in the Subscribed S-NSSAIs in the case that no Requested NSSAI was provided or none of the S-NSSAIs in the Requested NSSAI are permitted, i.e. do not match any of the Subscribed S-NSSAIs or not available at the current UE's Tracking Area (see clause 5.15.3).

- If the AMF can serve the S-NSSAIs in the Requested NSSAI, the AMF remains the serving AMF for the UE. The Allowed NSSAI is then composed of the list of S-NSSAI(s) in the Requested NSSAI permitted based on the Subscribed S-NSSAIs and/or the list of S-NSSAI(s) for the Serving PLMN which are mapped to the HPLMN S-NSSAI(s) provided in the mapping of Requested NSSAI permitted based on the Subscribed S-NSSAIs, or, if neither Requested NSSAI nor the mapping of Requested NSSAI was provided or none of the S-NSSAIs in the Requested NSSAI are permitted, all the S-NSSAI(s) marked as default in the Subscribed S-NSSAIs and taking also into account the availability of the Network Slice instances as described in clause 5.15.8 that are able to serve the S-NSSAI(s) in the Allowed NSSAI in the current UE's Tracking Areas. It also determines the mapping if the S-NSSAI(s) included in the Allowed NSSAI needs to be mapped to Subscribed S-NSSAI(s) values. If no Requested NSSAI is provided, or the mapping of the S-NSSAIs in Requested NSSAI to HPLMN S-NSSAIs is incorrect, or the Requested NSSAI includes an S-NSSAI that is not valid in the Serving PLMN, or the UE indicated that the Requested NSSAI is based on the Default Configured NSSAI, the AMF, based on the Subscribed S-NSSAI(s) and operator's configuration, may also determine the Configured NSSAI for the Serving PLMN and, if applicable, the associated mapping of the Configured NSSAI to HPLMN S-NSSAIs, so these can be configured in the UE. Then Step (C) is executed.

- Else, the AMF queries the NSSF (see (B) below).

**(B)** When required as described above, the AMF needs to query the NSSF, and the following is performed:

- The AMF queries the NSSF, with Requested NSSAI (excluding S-NSSAIs subject to NSSA which are in "Pending" state and are not yet in the Allowed NSSAI, if any), Default Configured NSSAI Indication, mapping of Requested NSSAI to HPLMN S-NSSAIs, the Subscribed S-NSSAIs (with an indication if marked as default S-NSSAI), any Allowed NSSAI it might have for the other Access Type (including its mapping to HPLMN S-NSSAIs), PLMN ID of the SUPI and UE's current Tracking Area.

- Based on this information, local configuration, and other locally available information including RAN capabilities in the current Tracking Area for the UE or load level information for a Network Slice instance provided by the NWDAF, the NSSF does the following:

- It verifies which S-NSSAI(s) in the Requested NSSAI are permitted based on comparing the Subscribed S-NSSAIs with the S-NSSAIs in the mapping of Requested NSSAI to HPLMN S-NSSAIs. It considers the S-NSSAI(s) marked as default in the Subscribed S-NSSAIs in the case that no Requested NSSAI was provided or no S-NSSAI from the Requested NSSAI are permitted i.e. are not present in the Subscribed S-NSSAIs or not available e.g. at the current UE's Tracking Area.

- It selects the Network Slice instance(s) to serve the UE. When multiple Network Slice instances in the UE's Tracking Area are able to serve a given S-NSSAI, based on operator's configuration, the NSSF may select one of them to serve the UE, or the NSSF may defer the selection of the Network Slice instance until a NF/service within the Network Slice instance needs to be selected.

- It determines the target AMF Set to be used to serve the UE, or, based on configuration, the list of candidate AMF(s), possibly after querying the NRF.

NOTE 4: If the target AMF(s) returned from the NSSF is the list of candidate AMF(s), the Registration Request message can only be redirected via the direct signalling between the initial AMF and the selected target AMF as described in clause 5.15.5.2.3.

- It determines the Allowed NSSAI(s) for the applicable Access Type, composed of the list of S-NSSAI(s) in the Requested NSSAI permitted based on the Subscribed S-NSSAIs and/or the list of S-NSSAI(s) for the Serving PLMN which are mapped to the HPLMN S-NSSAIs provided in the mapping of Requested NSSAI permitted based on the Subscribed S-NSSAIs, or, if neither Requested NSSAI nor the mapping of Requested NSSAI was provided or none of the S-NSSAIs in the Requested NSSAI are permitted, all the S-NSSAI(s) marked as default in the Subscribed S-NSSAIs, and taking also into account the availability of the Network Slice instances as described in clause 5.15.8 that are able to serve the S-NSSAI(s) in the Allowed NSSAI in the current UE's Tracking Areas.

- It also determines the mapping of each S-NSSAI of the Allowed NSSAI(s) to the Subscribed S-NSSAIs if necessary.

- Based on operator configuration, the NSSF may determine the NRF(s) to be used to select NFs/services within the selected Network Slice instance(s).

- Additional processing to determine the Allowed NSSAI(s) in roaming scenarios and the mapping to the Subscribed S-NSSAIs, as described in clause 5.15.6.

- If no Requested NSSAI is provided or the Requested NSSAI includes an S-NSSAI that is not valid in the Serving PLMN, or the mapping of the S-NSSAIs in Requested NSSAI to HPLMN S-NSSAIs is incorrect, or the Default Configured NSSAI Indication is received from AMF, the NSSF based on the Subscribed S-NSSAI(s) and operator configuration may also determine the Configured NSSAI for the Serving PLMN and, if applicable, the associated mapping of the Configured NSSAI to HPLMN S-NSSAIs, so these can be configured in the UE.

- The NSSF returns to the current AMF the Allowed NSSAI for the applicable Access Type, the mapping of each S-NSSAI of the Allowed NSSAI to the Subscribed S-NSSAIs if determined and the target AMF Set, or, based on configuration, the list of candidate AMF(s). The NSSF may return the NRF(s) to be used to select NFs/services within the selected Network Slice instance(s), and the NRF to be used to determine the list of candidate AMF(s) from the AMF Set. The NSSF may return NSI ID(s) to be associated to the Network Slice instance(s) corresponding to certain S-NSSAIs. NSSF may return the rejected S-NSSAI(s) as described in clause 5.15.4.1. The NSSF may return the Configured NSSAI for the Serving PLMN and the associated mapping of the Configured NSSAI to HPLMN S-NSSAIs.

- Depending on the available information and based on configuration, the AMF may query the appropriate NRF (e.g. locally pre-configured or provided by the NSSF) with the target AMF Set. The NRF returns a list of candidate AMFs.

- If AMF Re-allocation is necessary, the current AMF reroutes the Registration Request or forwards the UE context to a target serving AMF as described in clause 5.15.5.2.3.

- Step (C) is executed.

**(C)** The serving AMF shall determine a Registration Area such that all S-NSSAIs of the Allowed NSSAI for this Registration Area are available in all Tracking Areas of the Registration Area (and also considering other aspects as described in clause 5.3.2.3) and then return to the UE this Allowed NSSAI and the mapping of the Allowed NSSAI to the Subscribed S-NSSAIs if provided. The AMF may return the rejected S-NSSAI(s) as described in clause 5.15.4.1.

When either no Requested NSSAI was included, or the mapping of the S-NSSAIs in Requested NSSAI to HPLMN S-NSSAIs is incorrect, or a Requested NSSAI is not considered valid in the PLMN and as such at least one S-NSSAI in the Requested NSSAI was rejected as not usable by the UE in the PLMN, or the UE indicated that the Requested NSSAI is based on the Default Configured NSSAI, the AMF may update the UE slice configuration information for the PLMN as described in clause 5.15.4.2.

If the Requested NSSAI does not include S-NSSAIs which map to S-NSSAIs of the HPLMN subject to Network Slice-Specific Authentication and Authorization and the AMF determines that no S-NSSAI can be provided in the Allowed NSSAI for the UE in the current UE's Tracking Area and if no default S-NSSAI(s) could be added as described in step (A), the AMF shall reject the UE Registration and shall include in the rejection message the list of Rejected S-NSSAIs, each of them with the appropriate rejection cause value.

If the Requested NSSAI includes S-NSSAIs which map to S-NSSAIs of the HPLMN subject to Network Slice-Specific Authentication and Authorization, the AMF shall include in the Registration Accept message an Allowed NSSAI containing only those S-NSSAIs that are not to be subject to Network Slice-Specific Authentication and Authorization and, based on the UE Context in AMF, those S-NSSAIs for which Network Slice-Specific Authentication and Authorization for at least one of the corresponding HPLMN S-NSSAIs succeeded previously regardless the Access Type, if any.

The AMF shall also provide the list of Rejected S-NSSAIs, each of them with the appropriate rejection cause value.

The S-NSSAIs which map to S-NSSAIs of the HPLMN subject to Network Slice-Specific Authentication and Authorization is ongoing are in "pending" state in the AMF and shall be included in the Pending NSSAI. The Pending NSSAI may contain a mapping of the S-NSSAI(s) for the Serving PLMN to the HPLMN S-NSSAIs, if applicable. The UE shall not include in the Requested NSSAI any of the S-NSSAIs from the Pending NSSAI the UE stores, regardless of the Access Type.

If:

- all the S-NSSAI(s) in the Requested NSSAI are still to be subject to Network Slice-Specific Authentication and Authorization; or

- no Requested NSSAI was provided or none of the S-NSSAIs in the Requested NSSAI matches any of the Subscribed S-NSSAIs, and all the S-NSSAI(s) marked as default in the Subscribed S-NSSAIs are to be subject to Network Slice-Specific Authentication and Authorization;

the AMF shall provide an empty Allowed NSSAI to the UE in the Registration Accept message. Upon receiving an empty Allowed NSSAI, the UE is registered in the PLMN but shall wait for the completion of the Network Slice-Specific Authentication and Authorization without attempting to use any service provided by the PLMN on any access, except e.g. emergency services (see TS 24.501 [47]), until the UE receives an allowed NSSAI.

Then, the AMF shall initiate the Network Slice-Specific Authentication and Authorization procedure as described in clause 5.15.10 for each S-NSSAI that requires it, except, based on Network policies, for those S-NSSAIs for which Network Slice-Specific Authentication and Authorization have been already initiated on another Access Type for the same S-NSSAI(s). At the end of the Network Slice-Specific Authentication and Authorization steps, the AMF by means of the UE Configuration Update procedure shall provide a new Allowed NSSAI to the UE which also contains the S-NSSAIs subject to Network Slice-Specific Authentication and Authorization for which the authentication and authorization is successful. The AMF may perform AMF selection when NSSAA completes for the S-NSSAIs subject to S-NSSAI in "pending" status. If an AMF change is required, this shall be triggered by the AMF using the UE Configuration Update procedure indicating a UE re-registration is required. The S-NSSAIs which were not successfully authenticated and authorized are not included in the Allowed NSSAI and are included in the list of Rejected S-NSSAIs with a rejection cause value indicating Network Slice-Specific Authentication and Authorization failure.

Once completed the Network Slice-Specific Authentication and Authorization procedure, if the AMF determines that no S-NSSAI can be provided in the Allowed NSSAI for the UE, which is already authenticated and authorized successfully by a PLMN, and if no default S-NSSAI(s) could be added as described in step (A), the AMF shall execute the Network-initiated Deregistration procedure described in TS 23.502 [3], clause 4.2.2.3.3, and shall include in the explicit De-Registration Request message the list of Rejected S-NSSAIs, each of them with the appropriate rejection cause value.

If an S-NSSAI is rejected with a rejection cause value indicating Network Slice-Specific Authentication and Authorization failure or revocation, the UE can re-attempt to request the S-NSSAI based on policy, local in the UE.

*NEXT CHANGE (3)*

*END OF CHANGES*