**3GPP TSG-SA WG2 Meeting #13xS2-20xxxxx**

**Source: Apple**

**Title: Solution of Key Issue #8: Support of S-NSSAI-aware PLMN selection in roaming scenarios**

**Document for: Approval**

**Agenda Item: x.x**

**Work Item / Release: FS\_eNS\_Ph2 / Rel-17**

*Abstract: This contribution proposes a solution for Key Issue # 8 – Area of service: impact on PLMN selection in roaming in TR 23.700-40.*

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Key issue #8 is about to study whether and how to support S-NSSAI-aware PLMN selection.

*START of CHANGE*

## 6.0 Mapping Solutions to Key Issues

Table 6.0-1: Mapping of Solutions to Key Issues

|  |  |  |
| --- | --- | --- |
| Solution#'s | Solution Titles | Key Issue#'s |
| 1 | PCF measurement based Network Slice SLA control for Maximum Number of UEs parameter | 1 |
| 2 | Max number of UEs per Network Slice control at registration | 1 |
| 3 | AMF/NSSF based counting of UEs in a Network Slice | 1 |
| 4 | NWDAF enhancements for supporting of network slice quota on the maximum number of UEs | 1 |
| 5 | NWDAF enhancements for supporting of network slice quota on the maximum number of PDU Sessions | 2 |
| 6 | PCF-based counting of PDU Sessions in a Network Slice | 2 |
| 7 | Support of Network Slice SLA for Maximum Number of PDU sessions parameter | 2 |
| 8 | AMF and O&M based solution | 1, 2 & 4 |
| 9 | Monitoring multiple quotas of number of UEs/PDU Sessions per S-NSSAI at NWDAF | 1, 2 & 4 |
| 10 | Max number of PDU Sessions per Network Slice control via NSQ function | 2 |
| x | Support of S-NSSAI-aware PLMN selection in roaming scenarios | 8 |

*NEXT CHANGE (All text is new)*

## 6.X Solution #x: Support of S-NSSAI-aware PLMN selection in roaming scenarios

### 6.X.1 Introduction

This is a solution to Key Issue #8, "Area of service: impact on PLMN selection in roaming":

- When the UE is domestic roaming, how can the UE register in a VPLMN in the same or a neighbouring country of the HPLMN that offers roaming with a particular S-NSSAI of the HPLMN but that S-NSSAI is not currently available in the HPLMN?

- When the UE is international roaming, how can the UE register in a VPLMN that offers roaming with a particular S-NSSAI of the HPLMN?

### 6.X.2 High-level Description

In a VPLMN, the UE provides in the Registration Request the mapped S-NSSAIs values in the Requested NSSAI to the corresponding S-NSSAI values used in the HPLMN, however the UE may not have any information about mapped the mapped S-NSSAI values. There can be two possible roaming cases, domestic or neighbouring country and international roaming.

### 6.X.3 Procedures

#### 6.x.3.1 Handling of PLMN selection when UE is roaming in domestic or neighbouring country based on NAS signalling

The following figure represents a high-level procedure of the solution for domestic or neighbouring country roaming scenario:



Figure 6.X.3.1-1 – S-NSSAI-aware PLMN selection in a domestic roaming scenario

1) UE triggers initial or Mobility Registration Update with the network.

2) Registration Request is forwarded to AMF (belongs to HPLMN).

2a) AMF determines that this area has limited support for the requested S-NSSAI or in the area where roaming agreements are in place for the requested S-NSSAI. AMF creates a list of Equivalent PLMN(s) for the S-NSSAI with mapped S-NSSAI values. Equivalent PLMN for S-NSSAI is not meant for lower layer cell selection or reselection purposes.

3) The AMF returns Registration Accept message to the UE with a list of Equivalent PLMN(s) for the S-NSSAI.

4) UE lost the coverage of HPLMN or lost access to S-NSSAI.

4a) UE uses the received list of Equivalent PLMN(s) for S-NSSAI only for slice-specific PLMN selection, and searches for one of the PLMN(s) given in the list of Equivalent PLMN(s) for S-NSSAI.

5) UE triggers mobility registration towards the most preferred equivalent PLMN for S-NSSAI with mapped S-NSSAI information.

6) VPLMN accepts the registration that allows UE to use the mapped S-NSSAI.

#### 6.x.3.2 Handling of PLMN selection when UE is international roaming based on NAS signalling

The following figure represents a high-level procedure of the solution for international roaming scenario:



Figure 6.X.3.2-1 – S-NSSAI-aware PLMN selection in an international roaming scenario

1) UE triggers initial registration with the highest priority PLMN in the roaming country.

2) As part of the existing procedure, visited AMF may interact with HPLMN and UDM to authenticate the UE.

3) HPLMN determines to populate a list of preferred PLMN(s) with mapped S-NSSAI and send it in an integrity protected container similar to steering of roaming information. This information is integrity protected by the HPLMN.

4) V-AMF receives the integrity protected container from HPLMN.

5) V-AMF sends a Registration Accept message to the UE with integrity protected container.

6) If required, the UE can perform PLMN selection based on the list of preferred PLMN(s) with mapped S-NSSAI.

#### 6.x.3.3 Handling of PLMN selection when UE is roaming based on configuration

The UE selects and attempts registration on a VPLMN using an "Operator Controlled slice-specific PLMN Selector with Access Technology" data file in the SIM (in priority order) or stored in the ME (in priority order). Each entry on the list includes a PLMN ID with mapped S-NSSAI list.