**3GPP TSG-SA/WG2 Meeting #138E *S2-200xxxx***

**Elbonia, 20 – 24 April, 2020**

**Source: ZTE**

**Title: Solution to KI#7: Steering the UE towards the 5G-AN during PDU session Establishment**

**Document for: Agreement**

**Agenda Item: 8.8**

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

***Abstract of the contribution:*** *This contribution* *proposes a new solution to resolve the key issue#7*

# 1 Introduction

This contribution proposes a solution to steer the UE towards a proper 5G-AN (e.g. a specific frequency band) which supports the requested S-NSSAI.

During the pre SA2#139E eMeeting CC, one of the main disagreement is about the support for more than one frequency bands within the Allowed NSSAI – i.e. different S-NSSAIs within the Allowed NSSAI may each support a different frequency band, and all S-NSSAIs within the Allowed NSSAI needs to be supported simultaneously.

When examining the definition of Allowed NSSAI as stated in TS 23.501:

|  |
| --- |
| **Allowed NSSAI**: NSSAI provided by the Serving PLMN during e.g. a Registration procedure, indicating the S-NSSAIs values the UE could use in the Serving PLMN for the current Registration Area. |

***Observation#1:*** *According to the definition, there is no mention that all S-NSSAIs within the Allowed NSSAI can serve only one common frequency band within the current Registration Area. Hence, more than one frequency band support within the Allowed NSSAI should be allowed. It should be upto operator’s deployment decision to allow one or more frequency bands for a given Allowed NSSAI.*

***Observation#2:*** *According to the definition, there is no restriction that “all” S-NSSAIs within the Allowed NSSAI shall be used, rather, it is defined as “could be used” by the UE in the Serving PLMN for the current Registration Area. Hence, the simultaneously support for the S-NSSAIs within the Allowed NSSAI should be an objective but not an restriction.*

When looking into the TS 23.502, clause 4.13.6.1 EPS Fallback for IMS voice (see figure below), there is already precedence that the support for inter-RAT handover to respond to the MO and MT session initiation with or without N26. One would observe that the support for inter frequency handover should be feasible for KI#7.

***Observation#3:*** *Based on today existing capability for supporting inter-RAT mobility handover for EPS Fallback for IMS voice, the support for KI#7 to enable inter-frequency handover support across S-NSSAIs within the Allowed NSSAI using the common control plane should be feasible.*



**Reference to TS 23.502, clause 4.13.6.1 EPS Fallback for IMS voice**

To further examine some concerns that were raised during the pre SA2#139E eMeeting CC discussions for supporting more than one frequency bands within the Allowed NSSAI, this PCR proposes the following:

1. Supporting all S-NSSAIs within the Allowed NSSAI simultaneously

As discussed earlier, based on the current definition of Allowed NSSAI, it does not restrict the mandatory support for simultaneously operation for all S-NSSAIs within the Allowed NSSAI. Certainly, it is the objective to enable the simultaneous support as much as possible. In case when multiple PDU sessions are activated, this PCR proposes to leave it to 5G-AN, based on operator’s policy (e.g. preference and/or priority) and/or 5G-AN implementation, to determine whether to transfer the existing PDU sessions to the target 5G-AN.

1. Supporting MO or MT request for PDU session over the other frequency band

As shown in TS 23.502, clause 4.13.6.1 above, when MO or MT request is initiated, the network triggers the N2 PDU Session Modification request as described in TS 23.502, clause 4.3.3. This PCR proposes to make some adjustment to the procedures in clause 4.3.3 to support KI#7 for this particular scenario.

The full proposal of this PCR, to support KI#7 based on the understanding that a given Allowed NSSAI supports more than one frequency bands for the corresponding Registration Area, is described in the next clause below.

# 2 Proposal

It is proposed to agree the following changes in TR 23.700-40.

\*\*\*\*\*\*\*\*\*\*\*\*\* Start Changes \*\*\*\*\*\*\*\*\*\*\*\*\*

## 6.0 Mapping of 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 |
| 11 | Handling maximum number of sessions using NF status | 2 |
| x | Steering the UE towards the 5G-AN during PDU session Establishment | 7 |

\*\*\*\*\*\*\*\*\*\*\*\*\* Next Changes \*\*\*\*\*\*\*\*\*\*\*\*\*

## 6.x Solution #x: Steering the UE towards the 5G-AN during PDU session Establishment

### 6.x.1 Introduction

This solution addresses the key issue #7, especially on the following questions:

- How does 5GS steer UEs to a 5G-AN (e.g. a specific frequency band) that can support the network slices that the UE can use.

- What information does 5GS need to take a decision to steer UE to a proper 5G-AN.

- What information should be provided to the UE to select a proper 5G-AN and how it is sent to the UE.

- Any RAN impacts shall be identified and alignment with RAN WGs shall be pursued if any impacts are identified.

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

The assumption of this solution is there could be multiple S-NSSAIs(corresponding to multiple frequency bands) deployed within single Tracking Area. In this case the 5G-AN shall report all its supported S-NSSAI per Tracking Area towards the AMF in the NG Setup procedure. The AMF doesn’t need to know the frequency band supported by the 5G-AN.

During UE registration procedure, the AMF or NSSF generates Allowed NSSAI according to current specification, i.e. the AMF takes the requested NSSAI, the subscription and the S-NSSAI supported in the Registration Area, etc into account. The Tracking Area may support multiple S-NSSAIs correspond to different frequency bands, therefore it is possible that the Allowed NSSAI may include S-NSSAI corresponding to different frequency bands. When the Allowed NSSAI only includes S-NSSAI corresponding to single frequency band, the existing RFSP mechanism can be used to redirect the UE to a preferred frequency band.

When the UE initiate PDU Session establishment procedure via a 5G-AN, the current 5G-AN may not support the requested S-NSSAI, or neighbour’s cell is more suitable for the requested NSSAI. In this case when the 5G-AN receives N2 SM information which includes the requested S-NSSAI, it can steer the UE towards another 5G-AN which supports the requested S-NSSAI or is more suitable for the requested NSSAI. The mappings between S-NSSAI and frequency band are preconfigured in the 5G-AN and it is expected that the 5G-AN would know the supported S-NSSAI(s) in its neighbours’ cells.

In case of multiple PDU sessions are activated, it is up to 5G-AN implementation or operator policy to determine whether the UE should be transferred and determine which PDU Sessions are transferred to target 5G-AN. For example the 5G-AN may take the priority of 5QI of the QoS flows in each PDU Session and the capability of the target 5G-AN into account to make decision.

### 6.x.3 Procedures

Editor's note: This clause describes high-level procedures and information flows for the solution.



Figure 6.x.3-1: A high-level procedure of the solution

In step 6, the 5G-AN determines it cannot support the S-NSSAI of the PDU Session then it send back the N2 SM message with a reject cause value indicating mobility due to slice unavailability.

In step 7 the SMF suspends the PDU Session Establishment procedure.

In step 8, the source 5G-AN selects the target 5G-AN which supports the S-NSSAI or determines the target 5G-AN is more suitable for the S-NSSAI, then it performs handover or redirection towards the target 5G-AN. After the procedure the AMF notifies the SMF.

In step 9 the SMF resend the N2 SM message towards the target 5G-AN

In step 10 the PDU session establishment procedure continue via target 5G-AN.

### 6.x.4 Impacts on services, entities and interfaces

Editor's note: This clause describes impacts to existing entities and interfaces.

**5G-AN:**

- Preconfigure the mapping between S-NSSAI and corresponding frequency bands.

- Add new cause value to indicate the mobility due to slice unavailability

**SMF：**

**-** suspends the SM procedure when receives reject cause value indicating mobility due to slice unavailability

- Continue the SM procedure after the mobility completion.

**UE,AMF,PCF:**

- No impacts.

### 6.x.5 Evaluation

Editor's note: This clause provides an evaluation of the solution.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* End Changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*