**3GPP TSG-SA/WG2 Meeting #140e *S2-2004836r11***

**Elbonia, Aug, 2020**

**Source: ZTE, CATT, Apple**

**Title: KI#5,Sol#50, solution update and evaluation**

**Document for: Agreement**

**Agenda Item: 8.3**

**Work Item / Release: FS\_enh\_EC / Rel-17**

***Abstract of the contribution:*** *This contribution* *proposes update on solution 50*

# Discussion

There is an Editor Note in solution 50.

Editor’s Note: Per the KI3 description: the solution needs to first clarify “Whether Rel-16 ETSUN solution is sufficient to support the use case above and if there is a gap”. The AMF selects an I-SMF based on SMF service area The I-SMF determines the DNAI based on UE location. An SMF is assumed to know the mapping between DNAI and UE location when the UE is located in that (I-)SMF serving area

This paper discuss the problem that this KI#5 needs to resolve and propose to remove this Editor’s Note.

The following is the definition of SMF Service Area in TS 23.501.

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

From this definition it is possible that the SMF service area can be overlapped, which means the same UPF can be within different SMF Service areas.

**Observation 1: the SMF Service Area can be overlapped.**

According to the TS 23.502 clause 5.34.6 Interaction between I-SMF and SMF for the support of traffic offload by UPF controlled by the I-SMF

*When the I-SMF is inserted into a PDU Session, e.g. during PDU Session establishment or due to UE mobility, the I-SMF may provide the DNAI list it supports to the SMF. Based on the DNAI list information received from I-SMF, the SMF may provide the DNAI(s) of interest for this PDU Session for local traffic steering to the I-SMF e.g. immediately or when a new or updated or removed PCC rule(s) is/are received. The DNAI(s) of interest is derived from PCC rules*

From above it is clear that the I-SMF/SMF should be configured with a supported DNAI list. This means different I-SMF/SMF can be configured with different supported DNAI list.

**Observation 2: Different SMFs may be configured with different supported DNAI list.**

Based on the two observations above, let’s consider the following scenario. In this scenario, SMF1 service area includes TA1 and TA2, SMF2 service area includes TA2 and TA3. SMF1 service area and SMF2 service area are overlapped in TA2 and UPF3 is shared by both SMF service area. The SMF1 is configured to support DNAI1 and SMF2 is configured to support DNAI2. See the following figure.



When the UE access via TA2 to establish and PDU Session, the AMF retrieves both SMF1 service area and SMF2 service area from the NRF. As both service area can serve the current UE location TA2, the AMF selects any one of them, for example SMF1 to serve the PDU Session. When the AF request traffic routing towards DNAI2, as SMF1 is not configured to support DNAI2, the SMF1 cannot activate the traffic routing to DNAI2. This is the problem that the KI#5 needs to resolve.

**Conclusion: The current ETSUN mechanism doesn’t resolve key issue 5 as described above.**

In solution 50 it is proposed that the supported DNAI list is stored in the SMF profile in NRF and return to AMF or locally configured in AMF for SMF selection. The requested DNAI in the AF request is also provided to the AMF, so the AMF can select a proper I-SMF or SMF which can support the requested DNAI.

In the example above, the if the requested DNAI 2 in AF request is provided to AMF and the AMF knows that the SMF 2 can support the DNAI 2, so the AMF can select SMF 2 to serve the PDU Session and activate the traffic routing towards the DNAI2.

Based on the analysis above, it is proposed to remove the Editor Note in solution 50.

# 2 Proposal

It is proposed to agree the following update on solution 50.

 *\*\*\*\*\*\*\* start of 1st change \*\*\*\*\*\*\*\**

## 6.50 Solution #50: Activating the traffic routing towards Local Data Network per AF request

### 6.50.1 Description

The following solution corresponds to the key issue #5 on activating the traffic routing towards Local Data Network per AF request as specified in clause 5.5. This solution is applicable for Session Breakout Connection Model (for SSC Mode 1 PDU sessions)

The AF uses AF influence traffic mechanism to activate the traffic routing towards the requested DNAI. The AMF performs I-SMF selection. In order to select a proper I-SMF, the AMF selects an I-SMF based on requested DNAI(s).

The solution assumes 1) The supported DNAI list is stored in the SMF profile in NRF or locally configured in AMF.

 After receiving the AF influenced Traffic Steering Enforcement Control in the PCC rule, or after receiving the target DNAI in Nnef\_TrafficInfluence\_AppRelocationInfo after edge relocation, if the SMF determines its cannot serve the requested DNAI, it sends the requested DNAI to the AMF in e.g. Nsmf\_EventExposure service (but the way to send the DNAI information to the AMF is FFS). This option can be applied to existing PDU session.



Figure 6.50.1-1 Non-roaming architecture with I-SMF insertion to the PDU Session in reference point representation, with UL CL/BP

### 6.50.2 Procedure

#### 6.50.2.1 I-SMF insertion for existing PDU Session



Figure 6.50.2.1-1: Solution - I-SMF insertion for existing PDU Session

1. AF provides the target DNAI (s) (List of DNAIs, indicates to access the target Local DN, which is identified by DNAIs), N6 traffic routing info to the SM\_PCF and the AF will subscribe to the SMF exposure event. This procedure is same as the steps 1-4 defined clause 4.3.6.2 in TS 23.502 [3].

2. void

3a. The SM\_PCF updates the SMF with corresponding new PCC rule(s) including the target DNAI(s) for the PDU sessions by invoking Npcf\_SMPolicyControl\_UpdateNotify service operation. The service procedure is described in the step 5 in clause 4.3.6.2 of TS 23.502 [3].

3b. Either immediately or after application relocation, the AF may send Nnef\_TraficInfluence\_AppRelocationInfo including N6 traffic routing details corresponding to the target DNAI(s) to the SMF.

3c. When there is existing associated PDU session, the SMF invokes a Nsmf\_EventExposure service operation if it (or the associated old I-SMF) can not serve the target DNAI(s), and the content of the message includes the target DNAI(s), the PDU Session ID. This message triggers the AMF to select a suitable I-SMF for the PDU Session.

 If there is an I-SMF serving the PDU session, the target DNAI(s) , and the PDU Session ID need to be sent via the I-SMF.

4. When there is existing associated PDU session the AMF may select a new I-SMF which can serve the target DNAI for the PDU Session.

 If the AMF doesn't have the knowledge which DNAIs the I-SMF/SMF can serve the target DNAI based on local configuration, it invokes the NF discovery request with NRF which provides the list of SMFs supporting the requested DNAI(s).

 If the AMF receives more than one requested DNAI(s), the AMF selects a new I-SMF which can serve all the DNAI(s) associated with this PDU Session. If the AMF can’t find such I-SMF, the AMF determines to select an I-SMF which serves the target DNAI(s) per operator’s policy.

5. The AMF sends a Nsmf\_PDUSession\_CreateSMContext Request to the new I-SMF, the request message includes the target DNAI(s).

6. The new I-SMF retrieves SM Context from the old I-SMF (in the case of I-SMF change) or SMF (in the case of I-SMF insertion) by invoking Nsmf\_PDUSession\_Context Request.

7. The new I-SMF selects a new I-UPF based on the received SM context, e.g. target DNAI, S-NSSAI, and UE location information.

8. The new I-SMF initiates a N4 Session Establishment to the new I-UPF.

9. The new I-SMF invokes Nsmf\_PDUSession\_Update Request (in the case of I-SMF insertion) or Nsmf\_PDUSession\_Create Request (in the case of I-SMF change) towards the SMF. The SMF initiates N4 Session Modification toward the PSA1. And The SMF responds Nsmf\_PDUSession\_Create Response or Nsmf\_PDUSession\_Update Response to the new I-SMF.

10. If the AF has subscribed to user plane management event notifications, the SMF notifies the AF of the PSA change by invoking Nsmf\_EventExposure\_Notify service operation.

11. The new I-SMF sends a Nsmf\_PDUSession\_CreateSMContext Response to the AMF.

12. In the case of I-SMF reselection, the AMF sends Nsmf\_PDUSession\_ReleaseSMContext Request to old I-SMF for the release of resources in old I-SMF.

13. Add a PDU Session Anchor and Branching Point or UL CL controlled by I-SMF. The same procedure is performed as described in clause 4.23.9.1-1 starting from step 3 in TS 23.502 [3].

Steps 5 to 13 are per R16 specifications

### 6.50.3 Impacts on services, entities and interfaces

AMF:

1. Receives the target DNAI(s) from SMF.

2. selects I-SMF supporting the target DNAI

SMF:

1. Sends target DNAI(s) to AMF and triggers it to select an I-SMF can serve the target DNAI.

2. Register the supported DNAI list in NRF.

NRF:

1. Store the supported DNAI list in the service profile of the I-SMF/SMF.

 *\*\*\*\*\*\*\* start of 2nd change \*\*\*\*\*\*\*\**

# 7 Overall Evaluation

Editor's note: This clause will provide evaluation of different solutions.

## 7.X Evaluation for KI#5

There are two solutions on KI#5. One difference is in solution#50 the requested DNAI(s) is notified via Nsmf\_EventExposure service operation to AMF for I-SMF/SMF selection, while in solution#12 the requested DNAI(s) is sent to AMF via Namf\_Communication\_N1N2MessageTransfer service operation. After the AMF receives the requested DNAI(s) it can insert a proper I-SMF for current PDU session, or select a proper new I-SMF/SMF which can serve the requested DNAI(s) for existing/subsequent PDU session.

 *\*\*\*\*\*\*\* end of change \*\*\*\*\*\*\*\**