**SA WG2 Meeting #143E S2-20xxxxx**

**24 February-09 March 2021, Elbonia (revision of S2-20xxxx)**

**Source: Ericsson (Rapporteur)**

**Title: KI#1 conclusion from FS\_eNPN moderated email discussion**

**Document for: Approval**

**Agenda Item: 8.2.1**

**Work Item / Release: FS\_eNPN / Rel-17**

*Abstract of the contribution: This contribution proposes changes to KI#1 conclusion inline with the moderated email discussions for the FS\_eNPN open issues for KI#1.*

# 1. Introduction

The FS\_eNPN moderated email discussion is captured in S2-21xxxxx.

# 2. Discussion

## 2.1 Questions and answers for KI#1

See S2-21xxxxx.

## 2.2 Proposed way forward for KI#1

## KI#1-Q1: Additional SIB information for SNPN selection

Almost stated all that there is no need for more SIB information.

It is proposed to remove the related EN.

NOTE: handle any interactions of SIB and network selection when UE and/or network supports both KI#1 and KI#4 as part of normative CRs.

## KI#1-Q2: Simultaneous connections for UEs with one subscription

Majority preferred to support the functionality (17 vs 3).

It is proposed to update the TR and the WID with the functionality to support simultaneous connections for UEs with one subscription (i.e. to allow PDU Session to anchor also in the SP aka separate Entity).

## KI#1-Q3: Credentials for SNPN service continuity

There is no majority for progressing the work before SA1 replies.

It is proposed to wait for SA1 reply.

## KI#1-Q4: AAA-S providing subscription information

Majority preferred to not let AAA provide subscription data to UDM (16 vs 2 or 3).

It is proposed to remove the related EN.

## KI#1-Q5: Other UE ID than SUPI towards AAA

Majority see no need for another UE ID than SUPI/SUCI, but also a number of comments that it depends on SA3 work.

It is proposed to remove the related EN and if SA3 see the need for another UE ID than it will be introduced via SA3 during normative phase.

## KI#1-Q6: Additional mechanisms to update list of preferred SNPNs

Majority see no need for an additional mechanisms to update list of preferred SNPNs.

It is proposed to remove the related EN, and as already agreed resolve the UPU vs SoR during normative phase with input from CT1 and SA3.

# 3. Conclusion

The proposed way forward for "KI#1-Q1: Additional SIB information for SNPN selection" proposed to remove the related EN.

The proposed way forward for "KI#1-Q2: Simultaneous connections for UEs with one subscription" proposed to conclude to support simultaneous connections for UEs with one subscription (i.e. to allow PDU Session to anchor also in the SP aka separate Entity).

The proposed way forward for "KI#1-Q3: Credentials for SNPN service continuity" implied a need for waiting for LS reply from SA1 before concluding i.e. required change is TBD.

The proposed way forward for " KI#1-Q4: AAA-S providing subscription information" proposed to remove the related EN.

The proposed way forward for "KI#1-Q5: Other UE ID than SUPI towards AAA" proposed to remove the related EN.

The proposed way forward for " KI#1-Q6: Additional mechanisms to update list of preferred SNPNs" proposed to remove the related EN.

# 4. Proposal

It is proposed to make the following changes to TR 23.700-07.

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

## 8.1 Key Issue #1: Enhancements to Support SNPN along with credentials owned by an entity separate from the SNPN

### 8.1.1 Conclusions for scenario where the SNPN offers connectivity for UE(s) with credentials owned by separate entity offering AAA Server

The scenario where the separate entity owning the credentials has only an AAA Server is supported. It is proposed to adopt the following conclusion principles:

- The SNPN will host a function (e.g. enhanced AUSF or new NF) supporting primary authentication and authorization of SNPN UEs that use credentials from the AAA Server.

NOTE 1: Whether to use a new NF or enhanced AUSF will be determined based on feedback from SA WG3.

- The function (see above) forwards EAP messages to the AAA server that is acting as the EAP Server for the purpose of primary authentication and authorization.

- The user identity used to identify the UE during primary authentication and authorization towards the AAA sever is the same SUPI as used within the 5GC SNPN.

- The AMF discovers and selects the AUSF as described in TS 23.501 clause 6.3.4 using the Home Network Identifier and Routing Indicator present in the SUCI provided by the UE.

- The AUSF (e.g. enhanced AUSF or new NF) in SNPN selects the AAA hosted by the external entity. The discovery and selection functionality (within the AUSF) uses the domain name corresponds to the realm part (*specified in the NAI format for SUPI in clauses 28.15.2 and 28.16.2)*  within Network specific identifier that identifies the external entity to perform discovery and selection of the AAA hosted by the external entity.

- The UDM supports mobility management and session management subscription information that is needed at the time of Registration and Session Management procedure.

- After completing the primary authentication and authorization successfully, the AMF or SMF can retrieve the SNPN UE subscription data (i.e. mobility management and session management subscription) using SUPI from UDM.

NOTE 2: The interactions or interfaces between the existing/enhanced AUSF (or new NF) and the AAA server can be defined by SA2 during normative phase e.g. based on SA3's feedback.

### 8.1.2 Conclusions for mobility scenarios

The mobility procedures are based on:

- In the case that there are common AMF and/or N14 interface between the source network and target network, mechanism defined in TS 23.502 [6] clause 4.9.1 is re-used to address UE mobility.

- In the case of idle mode mobility, the UE performs initial or mobility registration as specified in clause 4.2.2.2.2 of TS 23.502 [6].

NOTE: Needed updates to find the correct source or target AMF and what are the applicable UE identities in the registration message will be determined in normative phase.

### 8.1.3 Conclusions for simultaneous data service from both V-SNPN and a separate entity owning the credentials (PLMN or SNPN)

The simultaneous data service from both V-SNPN and a separate entity can be supported by two PDU Sessions with one terminating in the V-SNPN and one in the separate entity.

### 8.1.4 Conclusions on SNPN selection for UEs with an SNPN subscription

The following enhancements will be progressed in the normative phase:

- Group ID as a specific case of SNPN ID reusing SNPN ID encoding in TS 23.003 [15], where

- Assignment mode 1 indicates self-managed Home SP Group ID values as the NID Value is chosen independently at deployment time.

- Assignment mode 0 indicates Home SP Group ID is globally unique as the NID Value is globally unique. One possibility for ensuring uniqueness is to use IANA PEN as in TS 23.003 [15].

- SIB will be enhanced as follows, for SNPN only:

- Indication that "access using credentials from a separate entity is supported"

- Optionally, supported Group IDs (GIDs)

- Optionally, an indication whether the SNPN allows registration attempts from UEs that are not explicitly configured to select the SNPN

NOTE 1: This refers to UEs that do not have an entry in the user-controlled or the separate entity-controlled lists of preferred SNPNs matching the SNPN's network identity and that do not have an entry in the separate entity-controlled prioritized list of Group IDs matching any of the Group IDs supported by the SNPN.

NOTE 2: The number of supported Group IDs that can be broadcast will be determined by RAN2.

- UE configuration

- User-controlled prioritized list of preferred SNPNs

- Separate entity controlled prioritized list of preferred SNPNs

- Separate entity-controlled prioritized list of Group IDs (GIDs)

NOTE 3: The UE may also only be configured with the separate entity-controlled prioritized list of preferred SNPNs or only the separate entity-controlled prioritized list of Group IDs.

NOTE 4: If the UE has multiple subscriptions owned by different entities separate from the SNPN it is assumed that the subscription to use is selected by implementation specific means (e.g. based on user input) prior to network selection.

- For a UE configured to use SNPNs, automatic SNPN selection is performed in the following order:

- UE selects and attempts to register with the SNPN it was last registered with (if available).

- UE selects and attempts to register with the available SNPN identified by a PLMN ID and NID for which the UE has SUPI and credentials (i.e. as in Rel-16).

- UE selects an available and allowable SNPN, which broadcasts "access using credentials from a separate entity is supported" indication and an SNPN ID contained in the user-controlled list (if available)

- UE selects an available and allowable SNPN which broadcasts "access using credentials from a separate entity is supported" indication and an SNPN ID contained in the separate entity-controlled list (if available)

- UE selects an available and allowable SNPN which broadcasts "access using credentials from a separate entity is supported" indication and a GID contained in the separate entity-controlled list (if available)

- If the UE has not found an available and allowable SNPN based on the above, the UE selects an available and allowable SNPN which broadcasts an indication that the SNPN allows registration attempts from UEs that are not explicitly configured to select the SNPN:

- If the UE detects a plurality of such SNPNs, the order in which the UE selects and attempts a registration with an SNPN is implementation specific

- If the UE is unable to find a suitable cell of any available and allowable SNPN based on the above, the UE attempts to camp on an acceptable cell of any available SNPN supporting emergency calls (irrespective of SNPN ID) or of any available PLMN (irrespective of PLMN ID), in limited service state.

- The UE continues automatic SNPN selection based on the above until a suitable cell is found or until the user stops the automatic selection procedure (in which case the user may proceed with manual network selection).

NOTE 5: The details of how to prevent a UE from automatically repeatedly selecting an SNPN that rejects the UE's registration (i.e. handling of permanently and temporarily forbidden SNPNs) can be defined by CT1.

- For manual SNPN selection the UE presents all available SNPNs, which broadcast the "access using credentials from a separate entity is supported" indication.

NOTE 6: The order in which available SNPNs are presented can be defined by CT1.

### 8.1.5 Conclusions for UEs with a PLMN subscription

The following enhancements will be progressed in the normative phase on how to perform SNPN access network authentication of a UE based on 3GPP identities and credentials supplied by the PLMN:

- SIB enhancements as described in clause 8.1.4.

- UE configuration enhancements as described in clause 8.1.4.

- PLMN controlled information for SNPN selection in the UE can be updated using the UE Parameters Update via UDM Control Plane Procedure as defined in TS 23.502 [6] clause 4.20.2 or Steering of Roaming (SoR) as defined in TS 23.122 [5] Annex C.

NOTE 1: Which of the two procedures to use will be determined during the normative phase based on feedback from CT1 and SA3.

- Network selection and registration.

- To enable a UE with PLMN subscription to select an SNPN, the UE needs to enter SNPN access mode.

NOTE 2: (De)activation of SNPN access mode is up to UE implementation.

- Once the UE has entered SNPN access mode, SNPN selection is performed as described in clause 8.1.4.

- Once an SNPN has been selected the UE attempts registration using the PLMN credentials.

### 8.1.6 Conclusions for scenario where the SNPN offers connectivity for UE(s) with credentials owned by separate entity offering AUSF and UDM

The scenario where the separate entity hosts UDM, AUSF and owns the subscription is supported. It is proposed to adopt the following conclusion principles:

- Discovery of AUSF/UDM in the separate entity can be supported by cross network service discovery and registration procedure as specified in TS 23.502 [6] clause 4.17.5 where Home PLMN is replaced by the separate entity. In order to facilitate selection of the separate entity owning the subscription (i.e. AUSF, UDM in the Home SNPN), the SUPI/SUCI provided by the UE contains a Home Network Identifier. When the SUPI type is an IMSI, the Home Network Identifier should comprise of PLMN ID + NID that points to the external entity; if SUPI is a Network Specific Identifier, the domain name corresponds to the realm part and the realm should identify the external entity.

- It is recommended to enhance Nudm, Nausf, Namf and Nsmf services to support access to an SNPN using credentials from a separate entity that has UDM and AUSF, including the scenarios with the Session Management procedures supported for PDU Sessions terminating in the SNPN and when they terminate in the separate entity.

### 8.1.7 Conclusions for update of Separate entity controlled prioritized list of preferred SNPNs

The following conclusions are made for updating the separate entity controlled prioritized list of preferred SNPNs over the control plane in the UE:

- Separate entity controlled prioritized list of preferred SNPNs in the UE can be updated using the UE Parameters Update (UPU) via UDM Control Plane Procedure as defined in TS 23.502 clause 4.20 or Steering of Roaming (SoR) as defined in TS 23.122 Annex C.

NOTE: Which of the two procedures to be used will be determined during the normative phase based on feedback from CT1 and SA3.

- An update of the Separate entity controlled prioritized list of preferred SNPNs from the separate entity may trigger the UE to perform SNPN selection again, e.g. to potentially select a higher prioritized SNPN.

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