**SA WG2 Meeting #S2-140E S2-200xxx**

**19 Aug - 2 Sep, 2020, Elbonia**

**Source: Ericsson**

**Title: Evaluation and conclusion for KI#1**

**Document for: Approval**

**Agenda Item:**

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

*Abstract of the contribution: This paper proposes the evaluation and conclusion for KI#1*

# Proposal

Add the following changes to TR 23.700-07.

\*\*\* BEGIN CHANGES \*\*\*

# 7 Evaluation

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

The entity separate from the SNPN that owns the credentials is called Home Service Provider (Home SP) in solution 1 and 2. In solution 4, it is called subscription owner (SO) and in solution 8, it is called Credentials Provider (CdP). The home SP can be a PLMN, identified with a PLMN ID or a SNPN identified with PLMN ID and NID. The SO is identified with a SO-ID which can be domain name and the CdP is identified with a CdP-ID.

Solution 1 and 2 are using network architectures with the same nodes and corresponding interfaces as the existing roaming architectures. Solution #3 is using the non-roaming architecture with a shared RAN (MOCN). Solution #4 and #8 are proposing new architecture to support AAA interfaces between SNPN and the service provider. One difference between solution #4 and #8 is that in solution #4, the AMF and SMF in SNPN is directly interfacing the AAA proxy whereas in solution #8, AMF and SMF in SNPN is using AUSF and UDM for authentication and subscription retrieval. The remaining solutions for key issue 1 are enhancements to the above-mentioned solutions and are not proposing any architectures themselves.

Solution 1 and 2 are supporting home routed scenarios. Solution 1 proposes to support session continuity for home anchored PDU session between SNPNs and PLMN either by using N14 based mobility (i.e., move UP between SNPNs or between SNPN and PLMN) or, if not N14 is deployed, by using the "Existing PDU Session" indication in the PDU Session Establishment Request. Solution 2 proposes the same mechanisms but also for mobility between SNPNs.

NOTE: This scenario requires 3GPP credentials being used as usage of non-3GPP credentials in this release is per service requirement for isolated networks only.

All solutions assume there is a Home SP subscription provisioned in the UE. They differ on what information that is needed for doing network selection:

- Solution 1: "Service Provider Controlled Network Selector" and Equivalent Home Service Provider list which include a mix of both PLMN IDs and "service provider IDs".

- Solution 2: User-controlled and SP-controlled prioritized list of preferred SNPNs and Roaming Groups. For PLMN subscriptions there is also a Visited Network Type Preference parameter.

- Solution 4: UE is configured with list of desired SNPNs including PLMN ID+NID, priority and subscribed SO-ID.

Solution 1 and 2 also proposes that UE configuration can be updated using any of the existing procedures i.e. UE configuration update or UE parameter update.

I.e., all solutions addressing the network selection for key issue one has a component where lists in the UE are used for doing network selection, but they differ in what is included in each entry of the lists.

Following information is proposed to be broadcasted in SIB:

- Solution 1: Optionally a SIB indication (with the meaning "access using Home SP credentials is supported") so that Rel-17 UEs can only attempt to connect to an SNPN using Home SP credentials when this indication is advertised.

- Solution 2: Indication that access using Home SP credentials is supported, list of supported roaming groups and Home SP IDs.

- Solution 4: Indication for support of EAA and optionally supported SO-ID list.

- Solution 9: SIB indication indicating support for "underconfigured" UEs.

Network selection is proposed to be handled as follows in the proposed solutions:

- Solution 1: Only using the UE configured lists and matching towards the broadcasted PLMN+NID value. If UE don’t get match in the configured lists, the UE will not try to register to any SNPN using home SP credentials. To prevent release 17 UEs to register in release 16 SNPNs it is proposed to either use the SIB indication or it can be handled by UE trying to register and SNPN respond with appropriate failure code.

- Solution 2: First priority is the user-controlled prioritized list of preferred SNPN (match with PLMN+NID), then Home SP-controlled prioritized list of preferred SNPNs (match PLMN+NID and roaming group), then matching broadcasted Home SP ID matching the UE's Home SP subscription. Last resort for SNPN subscriptions is to select and attempt registration in any SNPN supporting home SP credentials. Last resort for PLMN subscriptions is too use Visited Network Type Preference that steers the UE if it should try to register to available SNPNs and/or PLMNs.

- Solution 4: UE is using the list of desired SNPNs matching PLMN ID+NID of the desired SNPN is equal to the PLMN ID+NID received in broadcast, and the Subscribed SO ID of the desired SNPN is present in the Supported SO-ID list received in broadcast.

- Solution 9: As solution 1 but UE can as last resort also register to SNPNs that indicate support for “underconfigured” UEs.

All solutions have a component of matching the PLMN+NID in broadcast with configured lists in the UE. In solution 2, the UE is required to read additional information from the SIB namely the list of supported Roaming Group IDs from SIB to be able to evaluate the Home SP-controlled prioritized list of preferred SNPNs. When the configured lists in the UE has been processed, there are additional steps in solution 2 (i.e., reading Home SP info from SIB) and 9 (i.e., to check “underconfigured SIB indication) to support UEs registering to SNPNs without explicit configuration of that SNPN. No solution rules out that UE can attempt to register to SNPN without explicit configuration in the UE.

Solution 2 also proposes to support manual network selection and UE is presented with the available SNPNs (i.e., indication access using Home SP credentials is supported) and PLMNs (if PLMN subscription).

Solution 1 and 2 are re-using the existing registration procedure and the UE provides the identity of the Home SP and the Home SP is performing the authentication of the UE. Solution 4 and 8 provides updated registration procedures to support AAA interface to Home SP. One main difference is in solution 4 the AMF and SMF directly interface the AAA proxy whereas in solution 8 existing interfaces between AMF/SMF and AUSF/UDM are used.

When AAA is used in Home-SP to authenticate the UE as in solution 4 and 8 there are also solutions on how to provide subscription data for the UE. In solution 4 it is assumed that subscription data is fetched via AAA-P from AAA-S i.e., the AAA protocols are modified to carry the needed subscription data. This means that there will be an impact to information carried in AAA protocols and a need to upgrade the AAA infrastructure in the Home SP networks. In solution 10 there are two options, either pre-provisioned in the SNPN, or provisioned on-demand to the SNPN. In both options, the SNPN generates a UE subscription identifier (SI) for the provisioned subscription data that is used internally in the SNPN.

# 8 Conclusions

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

The entity separate from the SNPN (e.g. called Home SP in some solutions) can either be a PLMN identified with PLMN ID or an SNPN identified with PLMN ID + NID.

The following architectures options are to be supported:

- An architecture based on the existing roaming architectures as depicted in figure 6.1.1-1 and 6.1.1-2. Interfaces between the SNPN and the Home SP need not be the roaming interfaces, but details and naming can be decided during normative phase.

- MOCN architecture when home SP owns a complete 5GC and N2 and N3 interfaces are deployed between the V-SNPN and home SP. It is assumed that this option is supported by current specification and requires no further changes.

Editor’s note: The possibility to recommend an architectural option with home SP supporting AAA interfaces to service provider (SNPN) is pending input from SA3 and is FFS.Home routing between SNPN and Home SP when UE uses 3GPP credentials should be supported. Service continuity between SNPN and PLMN and between SNPNs when UE uses 3GPP credentials should be supported using N14 based method or "Existing PDU Session" indication in the PDU Session Establishment Request if N14 is not deployed.

Home SP subscriptions are provisioned in the UE.

Editor's note: It is FFS what lists are configured in the UE for doing network selection.

The lists configured in the UE for doing network selection can be updated using a procedure that can protect the content E2E between the UE and the Home SP e.g. UE parameter update procedure.

Editor's note: It is FFS if and what extra information need to be provided via SIB.

First part of network selection is to evaluate the UE configured lists and if there is a match between an announced SNPN and an entry in the list, the UE will attempt register to that SNPN.

Editor's note: It is FFS if roaming group information is to be included in SIB and being input to UE's network selection.

Editor's note: Remaining part of network selection is FFS i.e., support for Home SP info in SIB and the last resort mechanisms.

Authentication is done with AKA based methods for PLMN subscriptions using existing registration procedure. For SNPN (standalone) subscriptions, non-AKA authentication procedure can be used as described in annex B of TS 33.501 [7].

\*\*\* END CHANGES \*\*\*