**SA WG2 Meeting #S2-140E S2-2005582r06**

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

**Source: Ericsson**

**Title: KI#2: Evaluation and conclusion**

**Document for: Approval**

**Agenda Item: 8.2**

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

*Abstract of the contribution: This paper proposes the evaluation and conclusion for KI#2*

# Discussion

# Proposal

Add the following changes to TR 23.700-07.

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

# 3 Definitions of terms and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**Default UE credentials**: Information that the UE have before the actual onboarding procedure to make it uniquely identifiable and verifiably secure.

**Default Credential Server (DCS)**: The server that can authenticate a UE with default UE credentials or provide means to another entity to do it.

**NPN:** Non-Public Network as defined in TS 23.501 [4]. The terminology NPN refers to both SNPN and PNI-NPN in this TR unless otherwise stated.

**NPN credentials:** Information that the UE uses for authentication to access a NPN. NPN credentials may be 3GPP credentials or non-3GPP credentials.

**Onboarding Network (ON)**: The network providing initial registration and/or access to the UE for UE Onboarding.

**Provisioning Server:** The server that provisions the authenticated/authorized UE with the subscription data and optionally other configuration information.

**Subscription Owner (SO):** The entity that stores and as result of the UE Onboarding procedures provide the subscription data and optionally other configuration information via the PS to the UE.

**UE Onboarding:** Provisioning of information, to a UE and within the network, required for the UE to get authorized access and connectivity to an NPN.

**Unique UE identifier**: Identifying the UE in the network and the DCS and is assigned and configured by the DCS.

NOTE 1: The unique UE identifier is assumed to be unique within the DCS. It takes the form of a Network Access Identifier (NAI) using the NAI RFC 7542.

NOTE 2: the definition of terms has the scope to provide a common language compared to the definitions in specific solutions. It is up to solutions to use the common terms, when applicable.

**Overlay network:** When UE is accessing SNPN service via PLMN, SNPN is the overlay network. When UE is accessing PLMN services via SNPN, PLMN is the overlay network.

**Underlay network:** When UE is accessing SNPN service via PLMN, PLMN is the underlay network. When UE is accessing PLMN services via SNPN, SNPN is the underlay network.

\*\*\* NEXT CHANGES \*\*\*

# 7 Evaluation

## 7.X Key Issue #2: NPN support for Video, Imaging and Audio for Professional Applications (VIAPA)

The evaluation is based on major principles from the KI#2 solutions. The evaluation separates to different areas for each principle as below table:

Table 7.x-1: Evaluation of KI#2 related principles

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Principle | What it solves | Benefit, drawback | System impact | Open issues | Reference |
| N3IWF architecture | Service continuity aspect.Simultaneous data service aspect. | Benefit:Better isolation between SNPN and PLMN.Existing foundation for simultaneous connection between SNPN and PLMN.Drawback:Two subscriptions are needed. Two registrations are needed.There is no solution for Seamless service continuity for single radio capability UE. | Based on the existing release 16 architecture, No new major architecture impact  | UE is assumed not to enter CM-IDLE in the overlay network, but it is not clear from the current specification how the UE achieves it. | Solution #13,#14,#15,17,#18. |
| N3IWF architecture with dual radio capability (2RX/2TX) UE enhancement.  | Same as N3IWF architecture with more benefits shown in the next column.  | Benefit:Seamless service continuity.Simultaneous and independent data service and paging from both SNPN and PLMN native 3GPP access network.UE can access one 5GC via both 3GPP access and non-3GPP access to gain benefit of MA-PDU session. Drawback:Additional UE impact to support 2Rx/2Tx".Limited to only support 2Rx/2Tx UE .  | Require UE support of 2Rx/2Tx |  | Solution #13,#15 |
| N3IWF architecture with enhancement to keep UE in CM-Connected state in overlay network.  | Paging aspect. | Benefit:Re-use existing tools/mechanisms .Drawback:To support single radio UE only.  | UE logic to keep one PDU session in underlay network.Existing liveness check tool to be used over NWu interface to keep the NWu connection open. |  | Solution #13,#14 |
| N3IWF architecture with enhancement to keep UE in CM-Connected state in both overlay network and underlay network.  | Paging aspect. | Benefit:Reduced signaling setup time when UE always in CM-Connected state in underlay network.Optimized for UE’s batter power conservation. Drawback:  potential RAN impact.Support single radio UE only | RAN and CN impact to keep UE always in RRC-Inactive in the underlay network.PDU session in underlay network remains active. | Whether it is necessary to keep UE in CM-Connected in underlay network is FFS. | Solution #14 |
| N3IWF architecture with enhancement to introduce "inactive" mode on NWu interface. | Paging aspect. | Benefit:No CM state requirement for UE.Drawback:Potential Impact IPsec protocol which may be outside scope of 3GPP.  |  | IKEv2 impact is FFS.How does the DL IPSec data reach UE when NAT timeout is FFS. | Solution #17 |
| N3IWF architecture with enhancement to split DL traffic to Uu interface and UL traffic to NWu interface for 2RX/1TX UE. | Simultaneous data service aspect.  | Benefit:Better QoS via Uu interface.Support 2Rx/1Tx UE, Supplementary solution to 2RX/2TX principle.Drawback:More UE and RAN impact comparing to other solutions which only support 2Rx/2Tx UE. . | RAN impact for uplink control communication with single TxUE/AMF impact to support split indication.UE/SMF/UPF impact to support user data plane traffic path steering. |  | Solution #18 |
| N3IWF architecture with enhancement to enable underlay network to subscribe "paging/downlink data notification" service from the overlay network via exposure function. | Paging aspect. |  |  | NOTE: There is no solution based on this principle documented in the TR yet.  | S2-2005672 |
| N3IWF architecture with enhancement to assist UE to choose either SNPN or PLMN to use Uu interface for better QoS. | Simultaneous data service aspect. | Benefit:Guaranteed QoS for VIAPA service, by guiding UE to avoid random selection of Uu interface. |  | NOTE: There is no solution based on this principle documented in the TR yet.  | S2-2005296S2-2005124 |
| Inter-PLMN like architecture between SNPN and PLMN. | Service continuity aspect. | Benefit:Only one subscription is needed. Only one registration to one network is needed.Existing inter-PLMN mechanism can be re-used.Drawback:Service continuity is only applicable when the PDU session is anchored at home SP. | To be concluded from KI#1 evaluation. |  | Solution #1, #2. |
| N3IWF architecture with MUSIM like implementation | Concurrent paging and data service for single radio UE. | Benefit:Drawback: |  | The principle is not clearly stated in the solution. | Solution #15. |

# 8 Conclusions

## 8.X Key Issue #2: NPN support for Video, Imaging and Audio for Professional Applications (VIAPA)

Editor's note: These are INTERIM conclusions for Key issue #2.

When UE only has single subscription, the service continuity is to be evaluated by KI#1.

It is concluded that the existing N3IWF-architecture is used as the basis to address data service from both networks and service continuity between the two networks, including case which the interfaces and SLAs between SNPN and PLMN does not exist. Further, it is recommended to enhance the architecture with following principles:

- N3IWF architecture with enhancement to keep UE in CM-Connected state in overlay network taking into account UE power consumption.

NOTE: There are scenarios when the UE requires to reduce the power consumption for example for saving the battery life, while in other scenarios the UE has no restrictions for example due physical size of battery or limited duration of connectivity.

- The dual radio (2Rx/2Tx) UE implementation is used to achieve seamless session continuity

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