# FS\_eNPN - SA2 Open issues related to KI#1 and KI#4 and questions for resolving the open issues – moderated e-mail discussion…

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These questions and answers will be used to progress the SA2 work for FS\_eNPN KI#1 and KI#4.

Questions for open issues that require SA3 input has so far been excluded.

Ver2 includes changes addressing comments to the questions from Convida, Orange, Qualcomm, OPPO, Huawei and Futurewei.

As questions are added and changed, please re-send your proposed answers.

# Question KI#1-Q1: Service Providers

**Question**: What different types of service providers can be supported and what network functions can be assumed that these different types of service providers have?

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| **Company** | **Comments** |
| Futurewei | 1. PLMN: has 5GC and RAN 2. Verticals providing over-the-top service or other SNPN operators.    1. For the authentication issues of KI #1, this kind of service providers at less have to support AAA functions and may support non-3GPP credential and mechanism. The solution needs to have minimum impact on their existing AAA functions.    2. For mobility scenarios, SMF/UPF are needed, AMF/N3IWF may be needed. |
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# Question KI#1-Q2: Architectures

Several solutions exist proposing different existing or enhanced architectures to support KI#1 and we need to come to conclusions on which of these architectures we should agree on in this study. Example "architectures" proposed are e.g. MOCN, roaming like architecture, and AUSF connecting to "AAA".

**Question**: What existing architectures can be used to support KI#1 and what enhancements are needed on top of these architectures?

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| **Company** | **Comments** |
| Futurewei | MOCN, roaming like architecture (this option needs to support non-3gpp credential and AAA mechanism) and AUSF connecting to “AAA” should all be considered as valid options to satisfy different deployment scenarios. |
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# Question KI#1-Q3: Identifying the Service Providers

A separate entity providing the subscription can according to existing solutions be PLMNs or verticals that don't have a PLMN id. We should agree on how to identify these separate entities also called Service Providers

**Question**: How to identify the separate entity providing the subscription?

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| **Company** | **Comments** |
| Futurewei | Support to have SP-ID to differentiate with the network ID in order to identify the service provider who may not directly provide the communication service. |
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# Question KI#1-Q4: SNPN selection

In release 16 the UE had a subscription tied directly to the SNPN identity so that UE could read SIB1 network identities and directly know that it can register to a network with matching SNPN identity. In this key issue the subscription is owned by a separate entity with an identity according to question 1. There needs to be a mechanism to enable the UE to make an efficient network selection so that it selects a suitable SNPN.

## Question KI#1-Q4.1: SNPN selection based on UE pre-configuration

**Question**: Should it be possible to pre-configure the UE with the preferred SNPNs to select?

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| **Company** | **Comments** |
| Futurewei | Yes, the prefer SNPN can be pre-configured to UE or updated by service provider who own the UE subscription via the connecting network. |
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## Question KI#1-Q4.2: Support for SNPN selection in case UE does not have correct or sufficient information for SNPN selection

**Question**: Are there scenarios where the stored configuration information in the UE may not be sufficient to select the suitable SNPN and should those scenarios be supported?

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| **Company** | **Comments** |
| Futurewei | Yes, there are valid scenarios, such as a event company moves their concert equipment to a new concert within a short period time, and no time for reconfigure all the UEs for the new SNPN selection. |
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## Question KI#1-Q4.3: SNPN selection in case UE does not have correct or sufficient information for SNPN selection

**Question**: If there is a need to support scenarios where the UE is not pre-configured with the correct and sufficient information about which specific SNPN to select, is it sufficient that the UE selects (in any order) an available SNPN that supports accessing using credentials from a separate entity or should there be support to guide the UE which SNPN or PLMN to select?

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| **Company** | **Comments** |
| Futurewei | Randomly selecting and accessing a SNPN should be avoided, otherwise this will violate the requirement from SA1 regarding preventing unauthorized UE to accessing the SNPN. There should be mechanism to guide UE to select the proper SNPN in that situation. |
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# Question KI#1 – (new) Q5: Mobility and service continuity

For KI#1, TR mentions for mobility and service continuity

- UE moving from SNPN#1 with separate entity#1 to SNPN#2 with separate entity#1 available; and

- UE moving between SNPN#1 (where separate entity=PLMN) and PLMN.

However, some of the present available solutions are unclear on how such mobility and service continuity requirements are met. Are clarifications required before evaluation of solutions are done or will work be done in normative phase or is it not necessary to work on these requirements in this release.

**Question**: Should mobility and service continuity scenarios be studied and detailed in this study phase?

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| **Company** | **Comments** |
| Futurewei | Yes, service mobility and continuity need to be studied in this phase, as network selection will not only considering the initial network selection, but also the target SNPN selection during the mobility.  Also because we have new 3rd party service provider, as well as SNPN has different deployment models than traditional PLMN (such as high number of SNPN networks, small area of each SNPN, providing more specialized or dedicated services, so on), we should also consider the service mobility triggered by either UE or Service providers, such as SP can guide UE to select and move from the service SNPN to another overlapping SNPN or PLMN if there is need from SP. |
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# Question KI#4-Q1: Credentials in scope of provisioning

SA1, in [S1-201087](http://www.3gpp.org/ftp/TSG_SA/WG1_Serv/TSGS1_89e_ElectronicMeeting/Docs/S1-201087.zip), replied to the SA2 question whether provisioning requirement applies to SNPNs for:

1. IMSI accompanied by AKA credentials, both used for SNPN authentication
2. IMSI accompanied by AKA credentials, the IMSI being used to derive a Network Specific Identifier that will be used for SNPN authentication with the AKA credentials

SA1 reply:

"*A1) The quoted requirement applies to non-3GPP identities and credentials only, while SA2’s question refers to 3GPP identities and credentials. As such, the answer is no, the above-quoted requirement does not include provisioning of the mentioned identities and credentials to SNPNs. However, SA1 would like to point out that a requirement for remote provisioning has been included in TS 22.261, clause 6.14.2, since Release 15:*

*The 5G system shall support a secure mechanism for a home operator to remotely provision the 3GPP credentials of a uniquely identifiable and verifiably secure IoT device.*

This requirement was acknowledged as being part of "Existing features partly or fully covering the use case functionality" during FS\_AVPROD study (see TR 22.827)."

The KI#4 describes provisioning of e.g. "information" and "NPN subscription".

**Question**: Is there a need to accommodate the Key Issue description for Onboarding?

Answers:

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| **Company** | **Comments** |
| Futurewei | Credential should be in the scope of the provisioning. The current KI description is general enough to cover that and no need to be updated. |
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# Question KI#4-Q2: Provisioning for PNI-NPN

SA2 also asked about provisioning for PNI-NPN and SA1, in [S1-201087](http://www.3gpp.org/ftp/TSG_SA/WG1_Serv/TSGS1_89e_ElectronicMeeting/Docs/S1-201087.zip), provided answers to the SA2 questions as follows:

*Q2) SA2 would like to verify with SA1 whether the above-quoted requirement applies to PNI-NPN, which is the NPN “hosted by a PLMN” as described in TS 22.261 clause 6.25.1, or not, and what would be the corresponding use cases.*

*A2) SA1 requests clarification on the question from SA2, specifically, is SA2 asking if the above quoted question is related to primary or secondary authentication for the PNI-NPN.*

*Q3) If SA1 confirm the above-quoted requirement applies to PNI-NPN in Q2, SA2 have further Q3 as below.*

*For PNI-NPN, a UE may perform secondary PDU session authentication using 3rd party credentials, if the NPN is integrated in PLMN by means of dedicated DNNs, and/or a UE may perform Network specific slice authentication and authorisation (NSSAA) using 3rd party credentials if the NPN is integrated in PLMN by means of network slice. Given the authentication procedures already specified in TS 23.501, TS 24.501 and TS 33.501, SA2 would also like to ask whether provisioning for identities and credentials used for Network specific slice authentication and authorisation (NSSAA) and secondary PDU session authentication should be considered to be covered as part of NPN service requirement for onboarding and remote provisioning solution.*

*A3) SA1 requests clarification on the question from SA2, specifically, is SA2 asking whether 3rd party credentials may be used for secondary network slice authentication and authorization or*

*Is SA2 asking whether these 3rd party credentials for secondary authentication can be provisioned via the 3GPP system, or is SA2 asking something else.*

**Question**: is it in scope of the study to provision identities and credentials for PNI-NPN (e.g. used for NSSAA or secondary authentication)?

Answers:

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| **Company** | **Comments** |
| Futurewei | Yes. |
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# Question KI#4-Q3: AS impacts to support UE Onboarding

Question: What impacts do you foresee needed to the AS (Access Stratum) to support UE Onboarding?

Answers:

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| **Company** | **Comments** |
| Futurewei | Because we may consider both CP and UP based solution, this require the capability support from UEs, so the AS can be enhanced to support those 2 options. Need to decide after we studying all the potential solutions. |
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# Question KI#4-Q4: Assumptions regarding DCS

To address some solutions for KI#4, a DCS has been "defined" as:

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

The ownership of the DCS is FFS e.g. it can be owned by the device manufacturer or a 3rd party affiliated with the device manufacturer or by the ON. The ownership may imply a need for certain functionality or interfaces.

Also, the interfaces used by the DCS is FFS e.g. if SBA services can be assumed to be used by the DCS.

**Question**: In the solutions making use of a DCS, what assumptions can be made with regards to the DCS e.g. ownership and type of interfaces/protocols supported?

Answers:

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| **Company** | **Comments** |
| Futurewei | Due to the nature of vertical NPN deployment, the DCS may be closer to the SP or subscription owner rather than the device manufacturer. So, the DSC should be considered to have close collaboration with ON. Some SLA/trust relationship exist between them.  No preference on the interface protocol. |
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# Question KI#4-Q5: Assumptions regarding Provisioning Server

A PS has been "defined" as:

**Provisioning Server:** The server that will provision the UE.

The ownership of the Provisioning Server is FFS, e.g. it can be owned by the device manufacturer or a 3rd party affiliated with the device manufacturer or by the ON.

**Question**: What assumptions can be made with regards to the PS e.g. ownership and type of interfaces/protocols supported? How do we consider the compatibility with existing Provisioning Servers?

Answers:

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| **Company** | **Comments** |
| Futurewei | Prefer provisioning server locates in ON or the 3rd domain affiliated with the service provider or the ON. |
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# Question KI#4-Q6: UP or CP used for provisioning?

Solutions for UP and for CP have been discussed and added to the TR.

**Question**: Should UP or CP be used for provisioning, or both be possible? Is there any other potential provisioning mechanism?

Answers:

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| **Company** | **Comments** |
| Futurewei | Both options should be considered as they may be suitable for different deployment cases, as well as can be up to the UE capability. |
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# Question KI#4-Q7: Assumption of subscription in the network

It is FFS whether PEI or another UE identifier is used to identify a subscription that needs to be provisioned in the UE and how the list of UE identifiers is provisioned in the SNPN owning the subscription.

**Question**: How is the subscription that needs to be provisioned in the UE identified and how is it provisioned in the network.

Answers:

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| **Company** | **Comments** |
| Futurewei | There can be a temporary UE identifier preconfigured in the UE for onboarding, this Identifier need to be tied to the service provider who own the subscriptions, e.g. the ID can be the combination of a serial number assigned from a range from the SP, the service provider ID who owning the subscription, and other info to differentiate this device and its SP(e.g IMEI).  Onboarding network and provisioning server can be provisioned from different service providers with the subscriptions basing on this temporary UE Id associating with the service provider. When ON and provisioning server receive request from the UE, will use that ID to identify the corresponding provisioning subscriptions. |
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# Question KI#4-Q8: pre-configured information in the device

The device (UE) may have been pre-configured with information e.g. to ensure requirement "uniquely identifiable and verifiably secure" is satisfied and information related to e.g. Onboarding Network or Subscription Owner.

**Question**: What information is required to be available in the device prior to onboarding and what information *may* be available?

Answers:

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| **Company** | **Comments** |
| Futurewei | **The required default information:**  . a default temporary UE ID,  . Preferred SNPN list,  . Service provider Id,  . basic network configuration to allow to access the prefer ONs,  **The option default information:**  . PEI from the previous provisioning from previous network connection. (in case the UE has been used in the other network)  . Preferred Onboarding Network list.  . CP and UP based provisioning solution capability / preference indication  . default credential for onboarding operation  . prefer provisioning server address |
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# Question KI#4-Q9: 3GPP connectivity used for UE Onboarding

**Question**: Is the 3GPP connectivity used for UE Onboarding restricted in some way and if yes, how is it ensured that it is restricted such that it only can be used for onboarding?

NOTE: KI#4-Q3 addressed AS impacts to support UE Onboarding in general i.e. this question is related to mechanisms to potentially restrict the use of the 3GPP connectivity for only UE Onboarding purposes, i.e. if restriction is seen needed.

Answers:

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| **Company** | **Comments** |
| Futurewei | The 3GPP connectivity can be restricted, but not the must, should be optional. This can be determined based on the connectivity policy associated with the ON and the UE, as well as the agreement between SP and ON. E.g. if the ON may allow the UE to send some service specific information to the SP during the provisioning.  This Question is also related to Q12, which UDM can store some different network configuration policies. |
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# Question KI#4-Q10: Determination of Subscription Owner, DCS and Provisioning Server

**Question**: Who needs to determine the SO, DCS and the PS (UE and/or ON)? How is the SO, DCS and the PS determined?

Answers:

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| **Company** | **Comments** |
| Ericsson | TBD |
| Futurewei | we can assume there is trust and SLA between these three if they are not the same entity. |
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# Question KI#4-Q11: Duration of connectivity

**Question**: Is the time duration of the 3GPP connectivity used for UE Onboarding controlled by some means that requires standardization?

Answers:

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| **Company** | **Comments** |
| Futurewei | The standardization of time duration may not be needed. After the provisioning completes, the connectivity can be either torn down initiated by UE or the provisioning server, or the connectivity be modified and re-used in case the ON and SP are the same. |
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# Question KI#4-Q12: UDM for Onboarding

A UE is assumed to be able to perform some kind of registration for the purpose of getting connectivity for UE onboarding.

**Question**: Is there a UDM used during the onboarding procedure and what is then the role(s) of such UDM?

Answers:

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| **Company** | **Comments** |
| Futurewei | Yes, UDM needs to be involved if there will be differences network configuration for the provisioning of UE from different SPs, such as some use CP while others use UP. And even for same SP, there may be different provisioning category for different UEs. UDM can store those different user provision profile/subscription for the ON. |
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# Question KI#4-Q13: Slicing considerations

It is FFS whether any specific slicing considerations are needed.

**Question**: Are there any slicing considerations needed?

Answers:

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| **Company** | **Comments** |
| Futurewei | Provisioning can be considered as one service belonging to a slice, and uses the existing slicing mechanism. No additional slicing consideration is needed |
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# Question KI#4-Q14: Assumptions regarding IMS subscription

KI#3 scope is to enable IMS services.

If 5GS level credentials are not available in the UE, then the UE might not have any IMS level credentials either.

**Question**: Can provisioning of IMS level credentials be regarded as in scope of KI#4, and if yes, what additional mechanisms are required to support the envisioned scenarios of IMS deployments?

Answers:

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| **Company** | **Comments** |
| Futurewei | No opinion |
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# Question KI#4-Q15: Need for de-registration after provisioning?

It is FFS whether in case the ON and the SNPN owning the subscription are the same, there is a need for the UE to de-register, then select the SNPN and re-register or whether other procedures that does not result in de-registering would suffice

**Question**: Is there a need for de-registration after the UE been provisioned with a new subscription?

Answers:

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| **Company** | **Comments** |
| Futurewei | Deregistration may not be necessary in case the ON and the SNPN who owning the subscription are the same, e.g. the initial connectivity for provisioning can be modified after onboarding completed. |
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# Question KI#4-Q16: PNI-NPN

Update of PLMN subscription by adding NPN parts of the PLMN subscription may be envisioned as per TS 22.263 requirement:

"*Based on MNO and NPN policy, the 5G system shall support a mechanism to enable MNO to update the subscription of an authorized UE in order to allow the UE to connect to a desired NPN. This on-demand mechanism should enable means for a user to request on-the-spot network connectivity which is authorized by its MNO.*".

**Question**: What interactions between UE and network is required for adding or updating NPN parts of PNI-NPN subscription? What procedures in the network are required that are in SA2 scope?

Answers:

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| **Company** | **Comments** |
| Futurewei | The new update subscription may require PLMN to allow to establish a temporary connection for UE to get new NPN credential from a provisioning server affiliated with the NPN, then with the new credential, UE can access the NPN via PLMN after secondary authentication. This is in the scope of SA2. |
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# Rapporteur Summary

# Proposed Conclusions

The proposed conclusions will be used to identify solutions for the conclusions of the TR.

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