# 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** |
| OPPO | Have to have SPs that are separate and outside the SNPN or PLMN and provide the credentials that are for that vertical sector that that SP caters for. There can be different types of SPs but interactions to SP should be through off the shelf "open" non-proprietary protocols. |
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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** |
| OPPO | An architecture that supports external SP and external credential providers (for verticals). As far as possible, keep UE transparent to such architectures if different architectures are to be accepted, e.g. if more than one architecture is chosen, the UE must not need to distinguish one architecture from another. |
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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** |
| OPPO | Use of a new SP-ID, wherein the SP that UE selects is conveyed by UE to AMF AMF to select intended SP.  Resolving the format of the SP-ID can be deferred till a(some) settled architecture(s) is(are) agreed. |
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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** |
| OPPO | YES, pre-configuration. |
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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** |
| OPPO | It is difficult to quantify what is "sufficient", so we consider the question is about having correct information.  This is quite solution dependent and likely to be FFS. |
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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** |
| OPPO | As with our answer to Q4.2 |
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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** |
| OPPO | If some solutions are clear on meeting those requirements and some are not, making a choice at solution selection phase is not balanced. SO unless those requirements are void, then all solutions need to identify the way they meet those requirements. |
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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** |
| OPPO | The KI#4 on Onboarding should be a broad church, and not get stuck on what precise and nature of credentials are included and excluding those kinds of credentials e.g. even IMS credentials, e.g. 3rd party credentials, that has already have provisioning means. This way forward also allows for future – as yet not designed credentials to be provisioned by onboarding. |
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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** |
| OPPO | Same as answer to KI#4, Q1. |
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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** |
| OPPO | Information in SIBs to indicate the "associated" SPs/Provisioning servers seems inevitable. But more can only be ascertained when it is clearer about the solutions i.e. answer is solution dependent. |
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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** |
| OPPO | Separate DCS ownership must be supported and without requiring SBA services. Protocol to be used towards DCS should be open application level protocols, details for Stage 3 to decide. |
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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** |
| OPPO | In principle same answer as for KI#4-Q4 |
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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** |
| OPPO | Both CP and UP are needed.  What other potential provisioning mechanism will still go over either CP or UP and we consider it is a Stage 3 matter to consider such potential mechanism, if Stage 3 thinks fit to do so. |
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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** |
| OPPO | PEI or SUPI |
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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** |
| OPPO | At least default credentials and PEI. Others t.b.d with justification. |
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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** |
| OPPO | yes, need FFS on this. |
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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 |
| OPPO | UE should be able to determine this, but if not some mechanism in NW to consider default be available. |
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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** |
| OPPO | No, but NW should have right to delete/deallocate/revoke resources for whatever reason, eg. congestion, inactivity? However, we do not see a need to standardize this? |
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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** |
| OPPO | Yes, we see UDM has a role. Either for SNPN that does not deploy its 5GC – i.e uses the 5GC of PLMN – there will be some interactions with PLMN's UDM. Or if SNPN has its own (or access to) some subscription database, that is still a UDM role. |
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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** |
| OPPO | There will be some awareness of slice or some default slice considerations is applied if UE is not aware of slice to use. |
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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** |
| OPPO | YES. Same principle as answer given in KI#4-Q1. |
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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** |
| OPPO | If UE is already on "correct" NW, there is no need to de-register, but if there is a need, then it should be NW forcing that deregistration and not a built into UE function. |
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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** |
| OPPO | Same principle answer as for KI#4-Q14. |
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# Rapporteur Summary

# Proposed Conclusions

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

<conclusion X>

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