3GPP TSG-RAN WG2 #114-e R2-21XXXXX

Electronic meeting, 19th – 27th May, 2021

**Agenda item:** 8.16.2

**Source:** China Telecom

**Title:** SNPN and subscription or credentials by a separate entity

**Document for:** Discussion

# Introduction

This document is the report of the following email discussion:

* [AT114-e][028][eNPN] SNPN and subscription or credentials by a separate entity (China Telecom)

Scope: Start from the baseline, the tdocs under 8.16.2, identify easy agreements, potential agreements, discussion/open points, and identify questions to ask other group, if any,

Intended outcome: Report that paves the way for on-line agreements.

Deadline: May 24 1600 UTC (In time for CB online May 25)

**Rapporteur’s note**

The intention of the present document is to identify common views regarding the remaining open issues.  
Based on the companies' responses, the Rapporteur's proposals will be classified as:

* Cat-a: Proposals that could be agreed upon quickly
* Cat-b: Proposals that require further discussion
* Cat-c: Proposals that can be postponed

The aim is then, for Cat-a Proposals to be quickly treated online, allowing for Cat-b issues that require a more in-depth discussion or that have been on the table for some time already (e.g., congestion control), to be addressed during the online session.  
  
The deadline for inputs has been set so that there is enough time to take into account any further comments and fine-tune details of the Email Discussion Summary prior to the online session scheduled on May 25.

**Contact from companies**

To facilitate the potential discussion, the rapporteur recommends to provide contact information as follows:

|  |  |  |
| --- | --- | --- |
| Company | Name | Email address |
| China Telecom | Jiaxiang Liu | liujiaxiang6@chinatelecom.cn |
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| Nokia | György Wolfner | gyorgy.wolfner@nokia.com |
| OPPO | Jiangsheng Fan | fanjiangsheng@oppo.com |
| Apple | Sarma Vangala | svangala@apple.com |
| CATT | Rui Zhou | zhourui@catt.cn |
| Qualcomm | Ozcan Ozturk | oozturk@qti.qualcomm.com |
| CMCC | Li Chai | chaili@chinamobile.com |
| Samsung | Sangbum Kim | sb07.kim@samsung.com |
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| Ericsson | Felipe Arraño Scharager | felipe.arrano.scharager@ericsson.com |
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| LG | Sunghoon Jung | sunghoon.jung@lge.com |

# Discussion

## SIB for broadcasting GINs

The following agreement of GIN is achieved at RAN2#113-bis meeting:

* GIDs are broadcasted per SNPN in network sharing scenarios.

However, which SIB is responsible for broadcasting GINs is still FFS. Based on contributions provided by companies in this meeting, SIB1 has the advantage of fast SNPN selection procedure [1][3][5][7][8][15]. On the other hand, other SIB for GINs broadcasting could alleviate the burden of SIB1[4][12]. Since SIB10 is introduced for HRNN in Rel-16 NPN, [9][11] proposes to reuse SIB10 for broadcasting GINs. Furthermore, [6][14] recommends a new SIB considering the size limitation of SIB10.

**Q1: Which option do you think is the most reasonable for GINs broadcasting?**

* **Option A: SIB1**
* **Option B: SIB10**
* **Option C: New SIB**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comments** |
| China Telecom | SIB1 | We think it is the fast way for UE to recognize the GIN information for cell selection. Since we can reuse the Rel-16 restriction of the maximum number of network IDs per cell, there is no extra burden for SIB1. |
| Intel | New SIB | With a separate SIB, the number of Group IDs does not need to be too constrained with the total number of shared networks supported by the cell. The number can be per SNPN and left to Stage-3 discussion. If delay is a concern, the new SIB can also be set to a lower periodicity even though this delay is just for the initial cell selection as the support for GID is SNPN wide. |
| Nokia | New SIB | SIB1 is for essential information that is needed to access the cell. GINs are not essential for cell access (they are not needed for cell selection/reselection), they are only needed for network selection. Moreover, using SIB1 would introduce very strong undesired limitation in the number of GINs that can be supported in a cell. |
| OPPO | SIB1 | Group IDs are used for SNPN selection. Extra delay will be introduced for SNPN selection procedure if Group IDs are put in other SI, so it’s more desirable to include Group IDs in SIB1. If companies still have concern on the SIB1 overhead, we can limit the GIN number. |
| Apple | New SIB | We will not be too constrained on the number of group IDs with a new SIB. SIB1 from our view is getting overloaded due to the other work items as well such as NTN and will severely constrain the number of GINs that can be broadcasted. |
| CATT | New SIB | The size of the GINs list may be a bit large. If there is no separate entity for SNPN external subscription or credentials, the new SIB will not be broadcasted by the network. |
| ZTE | SIB1 | We share the same view as China Telecom and OPPO |
| Qualcomm | New SIB | We share the same concern on SIB1 limiting the number of GINs. SNPN deployments and GINs can be very large and SIB1 size should not be a limiting factor for the operators. |
| Huawei, HiSilicon | B or C | We are fine with option B and C. It is preferred to include GINs in a SIB other than SIB1 due to the large overhead. |
| CMCC | SIB1 | The group IDs are essential for network selection (SNPN selection), which requires low delay as well. The appropriate location to convey the GIDs is the SIB1. Regarding the number restriction, there is no clear commercial model presented now. |
| Samsung | First preference is new SIB, but also fine with SIB 10 | SIB1 is not appropriate choice considering size constraints, scope for future extensibility and no major impact on cell reselection delay with new SIB. A new SIB should be provided for this specific purpose. |
| vivo | SIB1 | The GINs are used for UE to discover and select the SNPN with subscription or credentials by a separate entity. As SIB1 is designed to control network selection and cell access, it is reasonable that the GINs should be put in SIB1. Moreover, if the GINs are put in the SIB other than SIB1, the acquisition of GINs will be delayed as the other SIBs carrying in SI message are transmitted by NW periodically. |
| MediaTek | SIB1 (and new SIB) | When the number of GINs+NPNs are <12, SIB1 can be used to carry the GINs, which also enables faster cell selection. When the number is higher, a new SIB can be used to carry the GIN information. |
| Ericsson | New SIB | In addition to the advantages that have already been mentioned, the presence of a new SIB in the SIB1 schedule has the advantage that it would directly indicate to UEs that GIN-related information is available. Thus, the UE can already decide after reading the SIB schedule in SIB1. In addition, including GINs in a new SIB would allow for different periodicity configurations if different periodicity requirements are observed between GINs and HRNNs. |
| Asia Pacific Telecom | SIB1 or New SIB | Since GINs may be considered during cell selection, SIB1 is better than SIB10. However, we are open to design a new SIB to satisfy the requirements. |
| LG | New SIB | First, using SIB1 requires a strict constraint o the max number of signalled GINs. Given that multiple GINs can be associated with each SNPN signalled in SIB1, such constraint would be too restrictive.  Second, we do not think scheduling GIN info in a new SIB yields unacceptable cell selection, because network can properly schedule the new SIB and cell selection does not need to happen too frequently. |

**Rapporteur’s Summary:**

16 companies express their opinions on which SIB for GIN broadcasting.

China Telecom, Oppo, ZTE, CMCC, Vivo, MTK and Asia Pacific Telecom **[7/16]** support SIB1 for fast network selection and the overhead of SIB1 can be limited by the number of GINs.

HW and Samsung **[2/16]** are fine with SIB10 for GIN broadcasting.

Intel, Nokia, Apple, CATT, Qualcomm, HW, Samsung, Ericsson, MTK, LG and Asia Pacific Telecom **[11/16]** support a new SIB aiming that the number of Group IDs does not need to be too constrained.

Since only 2/16 companies support SIB10, and the rapporteur proposes to make decision between SIB1 and new SIB online.

**Cat-b-Proposal 1 RAN2 makes decision of which SIB for GIN broadcasting between SIB1 and new SIB.**

## Maximum number of GINs

Rel-16 NPN has concluded the maximum number of network IDs for RAN sharing. The total number of networks of PLMN+PNI-NPN+SNPN, is 12 per cell. Some companies [5][7][15] think this restriction could be extended to GINs, i.e. #PLMN+#PNI-NPN+#SNPN+#GIN <= 12. However, some companies [9] think the limitation is independent for GINs, like 12 or 24. Meanwhile, there is still no consensus on the restriction is per cell[3][9][13] or SNPN[6][8].

**Q2.1: Do companies agree with the restriction of Rel-16 NPN could be extended to GINs(i.e. #PLMN+#PNI-NPN+#SNPN+#GIN <= 12)? The granularity is per cell or SNPN?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Yes/No** | **Per Cell or SNPN** | **Comments(If answer is no, please make your proposal)** |
| China Telecom | Yes | Per cell | We can reuse the original restriction in Rel-16 |
| Intel | No | Per SNPN | If it is in a new SIB, there is no need for such constraint and the max number is just for signalling purpose. Max 12 per SNPN is fine with us. |
| Nokia | No | Per cell, and per SNPN | The restriction on number NPNs is introduced to limit the number of networks that can share a cell. As CHs have no network that share a cell, they should not count to the networks sharing a cell.  A maximum number of GINS per cell is needed to limit the information to be advertised.  A maximum number per SNPN is useful, but not necessary. We propose a limit of 16 per SNPN. |
| OPPO | No | No strong view | We think GIN is in different domain compared to PLMN/SNPN/CAG, it’s not reasonable to extend the legacy limitation. |
| Apple | No | Per SNPN | GIDs are broadcasted per SNPN so the restriction should be per SNPN from our view based on the RAN2#113bis-e agreement. |
| CATT | No | Per cell | We think the GINs and PLMN/SNPN/CAG are not in the same level, and cannot be added together.  There should a max number of GINs per SNPN, but in RAN2 spec the limit of max number per cell is needed. |
| ZTE | Yes | Per cell | Another method maybe restrict **the total number of the legacy Network IDs including (PLMNs, PNI-NPNs, and SNPN) into 12, meanwhile restrict the total number of the Group IDs of all of the SNPNs into another maximum number(e.g. 12)** |
| Qualcomm | No | Per SNPN | Using the existing12 limit for all combinations will severely limit the usefulness of this feature. |
| Huawei, HiSilicon | No | Per cell | How to restrict the number of GINs depends on the answer to Q1.   * If the GINs are included in SIB1, the restriction of Rel-16 NPN could be extended to GINs, and the maximum value may also be extended e.g. to 24. * If the GINs are included in other SIB, the restriction on the number of GINs shall be independent from that of the network IDs in SIB1. |
| CMCC | Yes | Per cell | Up to 12 different Group IDs can be broadcasted in a cell.  If “mixed” network sharing is allowed (i.e. a cell can contain PLMNs, SNPNs/Group IDs), the total number of networks indicated in SIB1 (i.e. #PLMN + #SNPN + #PNI-NPN+ #Group IDs) shall not exceed 12. |
| Samsung | No | Per cell | Since GINs don’t represent the networks which shares a cell, the constraint of total network identifiers being less than 12 can’t be applied to GINs. |
| vivo | Yes | Per cell | In R15, the maximum number of RAN sharing between PLMNs is 12. When introducing NPN feature in R16, the maximum number of RAN sharing between PLMNs, SNPNs,PNI-NPNs is still 12. We prefer to follow this design principle of RAN sharing. Thus, it is suggested that the maximum number of RAN sharing between PLMNs, SNPNs, PNI-NPNs and GINs in R17 is also restricted to 12. |
| MediaTek | Yes | Per cell in case SIB1 is used | In case SIB1 is used, the number of PLMNs + SNPNS + PNI-NPNs + GINs should not exceed 12 due to the size of SIB1.  If a new SIB is used, the number can go higher. |
| Ericsson | No | Per cell | In network sharing scenarios, multiple SNPNs may support the same GIN and broadcasting the same GIN multiple times unnecessarily burdens the broadcast. Thus, it is beneficial to introduce a common “GIN-List” per cell (i.e., allow for one GIN to map to several SNPNs).  Also, the max number also depends on whether the GINs are provided in SIB1 or another SIB. |
| Asia Pacific Telecom | No | No strong view | GIN cannot represent the network operating the cell, like SNPN/CAG/PLMN. Thus, the number of GIN cannot be counted together with the numbers of SNPN/CAG/PLMN. Furthermore, GIN is Rel-17 NPN feature, not Rel-16 NPN.  It was agreed that GIDs are broadcasted per SNPN in network sharing scenarios. |
| LG | No | Per SNPN | Max 12 GINs per SNPN seems fine |

**Rapporteur’s Summary:**

This question is related to Q1. All companies **[5: China Telecom, ZTE, CMCC, Vivo, MTK]** which agree with the restriction of Rel-16 NPN could be extended to GINs(i.e. #PLMN+#PNI-NPN+#SNPN+#GIN <= 12) come from the companies supporting SIB1 for GIN broadcasting. However, **10 companies [Oppo, Asia Pacific Telecom, Intel, Nokia, Apple, CATT, Qualcomm, HW, Samsung, Ericsson]** think the new restriction of GIN number is needed, while the exact number is not the same. This question is tightly related on which SIB we put GIN in. Since no consensus is achieved, the rapporteur propose RAN2 discuss this together with Q1 and the following two options can be considered:

* Option A: If SIB1 for GIN broadcasting, the maximum number of PLMN+PNI-NPN+SNPN+GIN is twelve.
* Option B: If new SIB for GIN broadcasting, the maximum number of GIN is 12 or 16.

As for the granularity, **China Telecom, ZTE, CMCC, Vivo, MTK, CATT, HW, Samsung, Ericsson [9/16]** support it is per cell. While **Intel, Apple, Qualcomm, LG [4/16]** think it is per SNPN. **Nokia [1/16]** think we need both. **Oppo, Asia Pacific Telecom [2/16]** have no strong view. Most companies prefer per cell limitation.

**Cat-b-Proposal 2 RAN2 makes decision of the maximum GIN number between following options:**

* **Option A: If SIB1 for GIN broadcasting, the maximum number of PLMN+PNI-NPN+SNPN+GIN is twelve per cell.**
* **Option B: If new SIB for GIN broadcasting, the maximum number of GIN is FFS.**

The encoding of GIN determines how many bits one GIN occupies. However, there is a mismatch between TR 23.700-07[19] and TS 23.501[18] as mentioned in [13]. TR 23.700-07 concludes that “Group ID as a specific case of SNPN ID reusing SNPN ID encoding in TS 23.003”, while TS 23.501 states that “GIN reuses the NID encoding in TS 23.003 and can be self-managed or globally unique”.

**Q2.2: Do companies agree with sending LS to SA2 for clarifying whether GIN** **reuses SNPN ID or NID encoding? If answer is no, please indicate the right understanding.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes | We need this clarification |
| Intel | No strong view | This can be check by each company internally. |
| Nokia | No | SA2 specification is clear, GINs are encoded in the same way as SNPN IDs: PLMN ID and NID. (Agree with Intel, companies can check this with theirSA2 delegates.) |
| OPPO | No strong view |  |
| Apple | Yes | Ok to clarify. |
| CATT | Yes | Ok to clarify. |
| ZTE | Yes with comments | This can be check by each company internally, but if still no consensus achieved, we are OK to send this LS if we can’t achieve concensus |
| Qualcomm | It can wait | In current SA2 specifications, it is defined as NID without PLMN. But SA2 is discussing in this meeting whether to change that and add PLMN. We can follow their agreement and they may send us an LS on this anyway. |
| Huawei, HiSilicon | No | According to the approved CR [S2-2101079] to TS 23.501 in, it is clear that the GIN reuses the NID encoding. |
| CMCC | Yes | Ok to clarify. |
| Samsung | No |  |
| vivo | No | TS 23.501 is clearly stated that GIN reuses the NID encoding in TS 23.003. Event though there is a mismatch between SA2 TR 23.700-07 and SA2 TS 23.501, RAN2 just need to take SA2 TS into consideration. |
| MediaTek | Yes | Ok to check with SA2 on GIN encoding |
| Ericsson | Yes (proponent) |  |
| Asia Pacific Telecom | Yes | Good to clarify. |
| LG | Yes | We can CC CT1 |

**Rapporteur’s Summary:**

Although some companies think it can be checked by each companies internally, it still exists divergence of GIN encoding. 9 companies think is OK to send LS to SA2 for clarification. 4 companies think no need for LS, while they understanding is not converged. 2 companies have no strong view.

**Cat-b-Proposal 3 Send LS to SA2 for clarification of GIN encoding, i.e. reuseing SNPN ID or NID encoding.**

## Relationship between GID and indication of accessing using CH

In [3], it notices that for SNPN only support GIN, the separate entity supporting information can be implicitly indicated by broadcasting GIN and the indication shall not be set. However, [1][13] have different opinions and think they are set independently.

**Q3: Do companies think GID is set independently of indication of accessing using CH?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes | GID and the indication has different usage and we do not want to involve complexity. |
| Intel |  | This can be discussed later once the ASN.1 structure is made clearer |
| Nokia | No | The flag indicates that the SNPN can be accessed via CH, and GINs are IDs of CHs. If GINs are advertised without setting this flag, then UEs will never use the CHs to access the network as it is not allowed. |
| OPPO | Yes | GIN itself can implicitly indicate the support of third party credential. Even if the third party credential indicator is not set, the UE NAS behaviour is still unchanged. We see no need to combine the two parameters. |
| Apple | Yes | There is no need to combine both the parameters and we can indicate them separately. |
| CATT | Yes | Indicate them separately can make the specification clearer. |
| ZTE |  | For this issue, our concern is on the case that the SNPN only support Group ID. For example, for cell A, the SNPN 1 only support Group ID1, then the UE (with CH 1) that include the SNPN1 in user-controlled list may try on Cell A to access it’s corresponding CH 1, but for the Cell A, it only support Group ID1, it doesn’t support CH1. To solve this issue, the separate entity supporting information can be implicitly indicated by broadcasting Group ID for this case.  Anyway, we can access majorities ’views on it. |
| Qualcomm | Yes/No | There is dependence of GINs on CH but not the other way around. However, agree with others that we should have separate IEs. |
| Huawei, HiSilicon | Yes | Agree with China Telecom. |
| CMCC | Yes | No need to combine both the parameters and we can indicate them separately. |
| Samsung | Yes |  |
| vivo | Yes | If a SNPN support the access via subscription or credentials by a separate entity, the indication of accessing using CH should always be present following its meaning. |
| MediaTek | Yes | We do not see a need to combine the parameters and should indicate them separately. |
| Ericsson | Yes | We believe that the new indicator that "access using credentials from a separate entity is supported" should simply be set in accordance with its meaning (i.e., whenever 3rd party credentials are supported by the SNPN) and, thus, set independent of the GIN broadcast. Introducing a rule that the bit shall not be set to ‘1’ for specific cases unnecessarily increases the complexity of the specification and would unnecessarily cause confusion. |
| Asia Pacific Telecom | Yes | The intention of making GIN and indication of accessing using CH should be clarified. |
| LG | Yes |  |

**Rapporteur’s Summary:**

13 companies think GIN is set independently of indication of accessing using CH. The two parameters has their own meaning and should be set independently. Only 1 company wants to add restriction.

**Cat-a-Proposal 1 GIN is set independently of indication of accessing using CH.**

## HRNN

For manual network selection, Rel-16 involves SIB10 for broadcasting HRNN which corresponds to the NPN identity. [5] proposes that SIB10 is responsible for HRNN of GINs to align with Rel-16. Furthermore, [15] thinks the name of the respective entity separate from the SNPN owning the credentials (e.g. Home SP credentials) can also be sent to NAS. On the contrary, [12][16] think UE selects SNPN not GIN and object HRNN of GIN. However, [1][4][8][11] prefer to wait for SA2 requirement in this issue.

**Q4: Do companies support HRNN of GID? Does RAN2 send LS to SA2 for confirming the requirement of this issue?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Yes/No** | **Send LS to SA2?** | **Comments** |
| China Telecom | Yes | Yes | We think HRNN of GIN is as useful as HRNN of NPN. It will facilitate manual selection for User. Send LS to SA2 to confirm this requirement. |
| Intel | No | No | Group ID may correspond to multiple networks and does not seem logical to associate a Group ID with a HRNN which is used optionally for manual selection of a network by the UE. |
| Nokia | No | No | The requirement for HRNNs of GINs should come from SA1 or SA2. RAN2 has no technical reason to introduce this requirement. |
| OPPO | No | No | RAN2 is not the first group to discuss HRNN requirement, better to postpone the discussion. |
| Apple | No | No |  |
| CATT | No | No | It is not necessary to introduce HRNN of GINs in RAN2 unless SA2 has the requirement. |
| ZTE | FFS | No | We slightly prefer to wait for LS from SA2/CT1 |
| Qualcomm | No | No | This is not up to RAN2. |
| Huawei, HiSilicon |  |  | No strong views. RAN2 can wait for SA2 requirement. |
| CMCC | Yes | Yes | As we know that both automatic and manual PLMN selection in relation to SNPN along with credentials owned by an entity separate from the SNPN are agreed in SA2. And it obvious that HRNN of GIN is as useful as HRNN of NPN as this can enable the user acquires more information about the private network to determine whether to access it or not, i.e., both SNPN network information (e.g. airport network) and corresponding group information (e.g. Star Alliance). Now that companies think this is up to SA2, why do companies refuse to send LS to check with SA2? |
| Samsung | Yes | Yes | HRNN for GINs can be helpful in case of external credential access as the UE can access any V-SNPNs which the user might not have idea about. The SP-GINs’ HRNN can be more relevant to the user for manual selection than the HRNN of the VSNPN. |
| vivo | No | No | RAN2 has no reason to do that since there is no requirement from SA2. |
| MediaTek | Yes | Yes | Without HRNN, manual selection based on GIN information wouldn’t work. We are also ok to send an LS to SA2 to check this aspect. |
| Ericsson | No | No | There is no such requirement for human readable names for GINs. RAN2 should then assume that they are not needed, unless indicated by other WGs (e.g., SA2). |
| Asia Pacific Telecom | Yes | Yes | Agree with CMCC |
| LG | No | No | From our understanding, there is no requirement of using HRNN for GIN. |

**Rapporteur’s Summary:**

**5 companies [China Teleom, CMCC, Samsung, MTK, Asia Pacific Telecom]** think HRNN of GIN is useful for manual selection and willing to send LS to SA2. We notice all operators which participate this email discussion support HRNN of GIN. However, **11 companies [Oppo, ZTE, Vivo, Intel, Nokia, Apple, CATT, Qualcomm, HW, Ericsson, LG]** are not interested on this and think it should come from SA requirement.

**Cat-b-Proposal 4 RAN2 will not start working on HRNNs of GINs until the requirement for HRNNs of GINs is created in other WGs.**

## Interaction between NAS and AS

RAN2 has agreed the information from AS to NAS as following:

* In the UE, AS reports to NAS about the following broadcasted new parameters:

Indicator that "access using credentials from a separate entity is supported" in the cell per SNPN

Supported Group IDs

Indicator that "whether the SNPN allows registration attempts from UEs that are not explicitly configured to select the SNPN" per SNPN.

When GINs are selected by UE NAS, it is still no agreement about whether AS is visible for selected GINs. Based on the contributions in this meeting, rapporteur notice most companies tend to support that NAS only needs to send selected SNPN to AS as legacy, no other information is needed[1][4][6][8][12][16]. Only one company proposes NAS to indicate GINs and two indications related to external credentials to AS[10].

**Q5: Do companies support NAS sending GINs and two indications related to external credentials to AS?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| China Telecom | No |  |
| Intel | No | Only the selected SNPN (associated with the GID or corresponding to the indications which allow for CHs) is used for cell (re)selection/suitability check in UE and for AMF selection in RAN (as per legacy Rel-16) |
| Nokia | No | Same view as Intel |
| OPPO | No | Same view as Intel |
| Apple | No | Agree with Intel. |
| CATT | No | Agree with Intel. |
| ZTE | No |  |
| Qualcomm | No |  |
| Huawei, HiSilicon |  | This question is related to Q8. If the support of external credentials is not uniform for AMFs in the SNPN, AS needs to signal the indications/GIN to RAN for AMF selection. In this case, NAS should sends the indications/GIN to NAS. |
| Samsung | Yes | We have assumed SNPN could support multiple GINs, and each corresponding to different CHs. If so, RAN may need GINs info for AMF selection. |
| vivo | No | Agree with Intel. |
| MediaTek | No |  |
| Ericsson | No | Agree with Intel. |
| Asia Pacific Telecom | Yes | Agree with Samsung and Huawei. Alternatively, the NAS layer of the UE may directly inform the UE whether the cell broadcasting the two indications related to external credentials and GINs can be a candidate cell for cell (re)selection. |
| LG | No | GIN is only used as assistance info for network selection by NAS. Once NW selection is done, what matter to AS is only a selected SNPN. Since the network selected by NAS is represented by SNPN, we think only SNPN is used for AMF selection by RAN. |

**Rapporteur’s Summary:**

12 companies think NAS does not need to send GINs and two indications related to external credentials to AS, only the selected SNPN is enough for AMF selection and cell (re)selection. 3 companies believe that the selected GIN is useful for AMF selection if it is not all AMFs supporting external credential. The rapporteur thinks most companies do not want that information from NAS to AS.

**Cat-a-Proposal 2 NAS does not send selected GINs and two indications related to external credentials to AS.**

## Cell (re)selection

RAN2#113bis meeting has agreed that “To support SNPN with subscription or credentials by a separate entity, R2 assumes that there is no impact on cell (re)selection (e.g. no need to change suitable cell criteria).” [8] thinks this meeting needs to confirms that agreement. [2] also analyses that the new agreed CT1 CR does not impact suitable cell definition. However, one company involves new considerations on suitable cells as well as cell barring rules [10].

**Q6: Do companies confirm that to support SNPN with subscription or credentials by a separate entity, there is no impact on cell (re)selection?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes |  |
| Intel | Yes |  |
| Nokia | Yes |  |
| OPPO | Yes |  |
| Apple | Yes |  |
| CATT | Yes |  |
| ZTE | Yes |  |
| Qualcomm | Yes |  |
| Huawei, HiSilicon | Yes |  |
| CMCC | Yes |  |
| Samsung | Yes |  |
| vivo | Yes |  |
| MediaTek | Yes |  |
| Ericsson | Yes |  |
| Asia Pacific Telecom | FFS | We need to first discuss that (1) whether a UE can camp on a cell that is neither part of the selected SNPN nor the registered SNPN of the UE, but the cell supports access using credentials from a separate entity and (2) whether a UE can camp on a cell that is neither part of the selected SNPN nor the registered SNPN of the UE, but the SNPN operating the cell allows registration attempts from UEs that are not explicitly configured to select the network. It would change the definition of a suitable cell. |
| LG | Yes |  |

**Rapporteur’s Summary:**

15 of 16 companies think there is no impact on cell (re)selection to support SNPN with subscription or credentials by a separate entity. It is obvious a consensus.

**Cat-a-Proposal 3 There is no impact on cell (re)selection to support SNPN with subscription or credentials by a separate entity.**

## Connected mode mobility

According to SA2’s reply LS in S2-2101076[17], the support of external credentials is uniform for all cells in the SNPN. Therefore, there is no RAN2 impact of intra-SNPN handover [9][16]. Any potential impact is from other WGs like RAN3 or SA2[1][13].

**Q7: Do companies agree that no RAN2 impact of connected mode mobility for third party credential?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes |  |
| Intel | Yes | It is clear that there is no UE impact. Whether there are inter-node messaging impact will depend on the request from RAN3 or SA2 |
| Nokia | Yes |  |
| OPPO | Yes | Same view as Intel |
| Apple | Yes |  |
| CATT | Yes |  |
| ZTE | Yes |  |
| Qualcomm | Yes |  |
| Huawei, HiSilicon | Yes |  |
| CMCC | Yes |  |
| Samsung | Yes, assuming any impact on INM |  |
| vivo | Yes |  |
| MediaTek | Yes |  |
| Ericsson | Yes | RAN2 can assume that there is no impact on connected mode mobility. Potential impact can be addressed by RAN3. |
| Asia Pacific Telecom | Yes |  |
| LG | Yes | No impact on Uu procedure. |

**Rapporteur’s Summary:**

All companies think no RAN2 impact of connected mode mobility for third party credential.

**Cat-a-Proposal 4 RAN2 assume there is no RAN2 impact of connected mode mobility for third party credential.**

## AMF selection

Based on TS 23.501[18], clause 5.30.2.4, NG-RAN shall inform the AMF of the selected PLMN and NID. [1][13] believe the legacy procedure is enough while [14] wants to depend on the Home SP or GIN for AMF selection. [9] wonders whether the support of external credentials are uniform for all AMFs in an SNPN. The rapporteur recommend to confirm that no matter the AMFs supporting of external credentials are uniform, whether gNB could find the right AMF based on SNPN ID. If the answer is no, we can think about sending LS to SA2.

**Q8: Do companies agree that the legacy AMF selection procedure is enough? Do we need to send LS to SA2 to clarify whether the support of external credentials are uniform for all AMFs in an SNPN**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Yes/No** | **Send LS to SA2?** | **Comments** |
| China Telecom | Yes | We are OK to send LS to confirm that |  |
| Intel | Yes | No | We do not see a need to send a LS since AMF selection is not in the scope of RAN2. If RAN3 or CT1 think there is need for other information other than selected SNPN ID, they can inform RAN2. |
| Nokia | Yes | No | Same view as Intel: this is not the scope of RAN2. |
| OPPO | Yes | No strong view |  |
| Apple | Yes | Ok to clarify |  |
| CATT | Yes | Ok to clarify |  |
| ZTE | Yes |  |  |
| Qualcomm | Yes | No | Agree with Intel |
| Huawei, HiSilicon | Yes | Yes | If there is no common understanding about whether the support of external credentials are uniform for all AMFs in an SNPN, RAN2 can ask SA2 Ask SA2 to clarify. |
| CMCC | Yes | No | RAN3 is working on the LS to SA2 during this meeting |
| Samsung | No | Yes | It seems helpful to send a LS to SA2 for further clarification |
| vivo | Yes | No | Firstly, we do not see such requirement from SA2. Thus, RAN2 has no need to discuss AMF selection as it is in the scope of RAN3. Agree with intel that if RAN3 has any conclusions which needs RAN2 work, they will inform RAN2. |
| MediaTek | Yes | No | Same view as Intel |
| Ericsson | Yes | No | Agree with Intel. Any new information needed for AMF selection should be triggered by RAN3 or SA2. Plus, the TR concludes (clause 8.1.2 that: “Support of authentication using credentials from an external entity is homogenous throughout a SNPN i.e. the SIB information in clause 8.1.4 should be set uniformly and no changes in mobility handling are needed to address inhomogeneous support of the feature.” |
| Asia Pacific Telecom | No | Yes | Agree with Samsung |
| LG | Yes | No | Not in the RAN2 scope |

**Rapporteur’s Summary:**

14 of 16 companies think the legacy AMF selection procedure is enough. Opponents mainly have concern on whether the support of external credentials are uniform for all AMFs in an SNPN. 6 companies want to send LS to SA2 for clarification. Since the majority of companies think the selected SNPN ID is enough for AMF selection, the rapporteur suggests to wait for RAN3 requirements.

**Cat-a-Proposal 5 The selected SNPN ID is enough for AMF selection.**

## Others

Since some open issues need to be addressed first, the rapporteur to postpone the detail design of ASN.1 mentioned in [1][3][7][8][9]. After RAN2 decides which SIB for GIN broadcasting, whether we need HRNN, etc, we can come back to these contributions.

**Q9.1: Do companies agree that ASN.1 design could be postponed?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes |  |
| Intel | Yes |  |
| Nokia | Yes |  |
| OPPO | Yes |  |
| Apple | Yes |  |
| CATT | Yes |  |
| ZTE | Yes |  |
| Qualcomm | Yes |  |
| Huawei, HiSilicon | Yes |  |
| CMCC | Yes |  |
| Samsung | Yes |  |
| vivo | Yes |  |
| MediaTek | Yes |  |
| Ericsson | Yes |  |
| Asia Pacific Telecom | Yes |  |
| LG | Yes |  |

**Rapporteur’s Summary:**

All companies support to postpone this issue.

**Cat-c-Proposal 1 ASN.1 design could be postponed.**

It has been proposed in [2] that RAN2 to discuss trusted 3rd party authentication servers. Since this is a new topic never discussed before, the rapporteur recommends to postpone this issue.

**Q9.2: Do companies agree that trusted 3rd party authentication servers related issues could be postponed?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes |  |
| Intel |  | This is not in the scope of RAN2. If there is a need for this, it should come from other WGs. |
| Nokia | Yes | Same view as Intel: RAN2 should only work on this if requirements from other WG come. |
| OPPO | Yes |  |
| Apple | No | We feel there will be impact later on atleast from RAN2 perspective in terms of how to indicate trustworthiness of a specific server. One of the use-cases is UEs only authenticating with a trusted authentication server in specific SNPNs. We want to ensure that AS layer can send this indication so that UEs can postpone procedures until after such and indication is obtained. Atleast for such cases a discussion of 3rd party authentication servers is needed. |
| CATT | Yes |  |
| ZTE | Yes |  |
| Qualcomm | Yes+ | This should be dropped; it is not within RAN2 scope. |
| Huawei, HiSilicon | Yes | No discussion on this issue is needed, unless required by other WGs. |
| CMCC | Yes |  |
| Samsung | Yes |  |
| vivo | Yes |  |
| MediaTek | Yes | This is outside RAN2’s scope |
| Ericsson | Yes | Agree with Intel, this is out of RAN2 scope. |
| Asia Pacific Telecom | Yes |  |
| LG |  | Not in RAN2 scope. No need to discuss this. |

**Rapporteur’s Summary:**

Most companies think it is out of RAN2 scope.

**Cat-c-Proposal 2 RAN2 is not responsible for trusted 3rd party authentication servers.**

Access control related proposals are shown in [9][14], the rapporteur recommends to postpone this issue.

**Q9.3: Do companies agree that access control related issues could be postponed?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes |  |
| Intel |  | We do not see a need to enhance access control. |
| Nokia | Yes | RAN2 should only work on this if requirements from other WGs come. |
| OPPO | Yes |  |
| Apple | Yes | Can wait for requirements to come from other groups. |
| CATT | Yes |  |
| ZTE | Yes |  |
| Qualcomm |  | It is fine to discuss in the upcoming meetings as it is an optimization. |
| Huawei, HiSilicon | Yes |  |
| Samsung | No |  |
| vivo | Yes |  |
| MediaTek | Yes+ | We do not see a reason to enhance access control |
| Ericsson | Yes | As mentioned by Intel, we see no need to modify existing access control mechanisms. |
| Asia Pacific Telecom | Yes |  |
| LG | Yes | We see no need to enhance access control for this use case |

**Rapporteur’s Summary:**

Most companies think access control related issues could be postponed

**Cat-c-Proposal 3 Access control related issues could be postponed.**

It has been proposed in [14], for RAN2 to discuss if V-SNPN info of neighbour cells is collected and reported for ANR purpose. [1] supports to extend ANR function for third party credential and Onboarding.

**Q9.4: Do companies agree that ANR related issues could be postponed?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes |  |
| Intel | Yes |  |
| Nokia | Yes |  |
| OPPO | Yes |  |
| Apple | Yes |  |
| CATT | Yes |  |
| ZTE | Yes |  |
| Qualcomm | Yes |  |
| Huawei, HiSilicon | Yes |  |
| CMCC | Yes |  |
| Samsung | Yes |  |
| vivo | Yes |  |
| MediaTek | Yes |  |
| Ericsson | Yes |  |
| Asia Pacific Telecom | Yes |  |
| LG | Yes |  |

**Rapporteur’s Summary:**

All companies think ANR related issues could be postponed

**Cat-c-Proposal 4 ANR related issues could be postponed.**

# Conclusion

Proposals that could potentially be agreed upon quickly

**Cat-a-Proposal 1 GIN is set independently of indication of accessing using CH.**

**Cat-a-Proposal 2 NAS does not send selected GINs and two indications related to external credentials to AS.**

**Cat-a-Proposal 3 There is no impact on cell (re)selection to support SNPN with subscription or credentials by a separate entity.**

**Cat-a-Proposal 4 RAN2 assume there is no RAN2 impact of connected mode mobility for third party credential.**

**Cat-a-Proposal 5 The selected SNPN ID is enough for AMF selection.**

Proposals that require further discussion

**Cat-b-Proposal 1 RAN2 makes decision of which SIB for GIN broadcasting between SIB1 and new SIB.**

**Cat-b-Proposal 2 RAN2 makes decision of the maximum GIN number between following options:**

* **Option A: If SIB1 for GIN broadcasting, the maximum number of PLMN+PNI-NPN+SNPN+GIN is twelve per cell.**
* **Option B: If new SIB for GIN broadcasting, the maximum number of GIN is FFS.**

**Cat-b-Proposal 3 Send LS to SA2 for clarification of GIN encoding, i.e. reuseing SNPN ID or NID encoding.**

**Cat-b-Proposal 4 RAN2 will not start working on HRNNs of GINs until the requirement for HRNNs of GINs is created in other WGs.**

Proposals that can be postponed

**Cat-c-Proposal 1 ASN.1 design could be postponed.**

**Cat-c-Proposal 2 RAN2 is not responsible for trusted 3rd party authentication servers.**

**Cat-c-Proposal 3 Access control related issues could be postponed.**

**Cat-c-Proposal 4 ANR related issues could be postponed.**

# Reference

1. R2-2104767 Support SNPN with subscription or credentials by a separate entity OPPO discussion Rel-17 NG\_RAN\_PRN\_enh-Core
2. R2-2105125 Additional considerations for access of SNPN with credentials from a different entity Apple discussion Rel-17 NG\_RAN\_PRN\_enh-Core
3. R2-2105167 Consideration on the Separate Entity Supporting ZTE Corporation, Sanechips discussion Rel-17 NG\_RAN\_PRN\_enh-Core
4. R2-2105192 Further Consideration on Subscription or Credentials by CH CATT discussion Rel-17 NG\_RAN\_PRN\_enh-Core
5. R2-2105200 Consideration on GIN related issues China Telecommunication discussion Rel-17 NG\_RAN\_PRN\_enh-Core
6. R2-2105244 Discussion on GINs from RAN2 perspective Nokia, Nokia Shanghai Bell discussion Rel-17 NG\_RAN\_PRN\_enh-Core
7. R2-2105291 Remaining issues on supporting SNPN with subscription or credentials by a separate entity vivo discussion
8. R2-2105409 SNPN access with different entity credentials Qualcomm Incorporated discussion
9. R2-2105570 Accessing SNPN with credentials owned by a credentials holder Huawei, HiSilicon discussion
10. R2-2105632 Cell (re)selection for Rel-17 NPN enhancements Asia Pacific Telecom, FGI discussion
11. R2-2105670 RAN2 impact to support SNPN with credentials by a separate entity MediaTek Inc. discussion Rel-17 NG\_RAN\_PRN\_enh-Core R2-2103782
12. R2-2105915 Support of credentials owned by third party entities in SNPN Intel Corporation discussion Rel-17 NG\_RAN\_PRN\_enh-Core
13. R2-2106034 SNPN access using external credentials Ericsson discussion Rel-17 NG\_RAN\_PRN\_enh-Core
14. R2-2106199 On Supporting Visited SNPN with Credentials Samsung discussion NG\_RAN\_PRN\_enh-Core
15. R2-2106246 Left Issues on Supporting SNPN with Credentials by a Separate Entity CMCC discussion Rel-17 NG\_RAN\_PRN\_enh-Core
16. R2-2106296 Resolving issues for access with external CH LG Electronics discussion Rel-17
17. S2-2101076, Reply LS on clarification request for eNPN features, SA2 #143-e
18. TS 23.501, “System architecture for the 5G System (5GS); Stage 2”, V17.0.0, 2021-03
19. TR 23.700-07, “Study on enhanced support of non-public networks”, TSG SA, V17.0.0, 2021-03