**3GPP TSG-RAN WG2 Meeting#109 electronic R2-200xxxx**

**24th February - 6th March, 2020**

**Source: ZTE Corporation, Sanechips**

**Title: draft\_Report of offline [119 [PRN] HRNN and Access Control aspects (ZTE)**

**Agenda item:** **6.18.4**

**Document for:** **Discussion and Decision**

# Introduction

This is the report for the following offline discussion:

* **[AT109e][119][PRN] HRNN and Access Control aspects (ZTE)**

Scope: Discuss the proposals from [R2-2001675](file:///C:\Data\3GPP\Extracts\R2-2001675%20Summary%20of%20%5bPRN%5d%20Other%20(HRNN,%20Access%20Control,%20etc)%20v1.docx).

Initial intended outcome:

* + - Initial set of proposals with full consensus (agreeable over email)

Initial intermediate deadline (for companies' feedback): Thursday 2020-02-27 23:59 CET

Initial intermediate deadline (for rapporteur's list of proposals): Friday 2020-02-28 12:00 CET

Proposed agreements not challenged until Monday 2020-03-02 12:00 CET will be declared as agreed by the session chair.

Final intended outcome: summary of the offline discussion in R2-2001682 with:

* + - (Further) set of proposals with full consensus, if any (agreeable over email)
    - Set of proposals with almost full consensus to discuss in the follow up conference call
    - Set of open issues and proposals to postpone to next meeting
    - Open issues that should no longer be pursued

Final deadline (for companies' feedback): Monday 2020-03-02 23:59 CET

Final deadline (for rapporteur's summary): Tuesday 2020-03-03 12:00 CET

Based on the summary [1] about HRNN, access control and some other issues, the following key issues will be discussed in this offline discussion.

* Key Issue 1: Association between the NPN ID and the HRNN [2][4][5][9]
* Key Issue 2: UAC for SNPN and CAG [4][5][8][9][11]

# Key issues

## **Key Issue1- Association between the NPN ID and the HRNN**

At RAN2#107 and RAN2#108, the following agreements have been made on HRNN broadcasting and handling.

RAN2#107

If HRNN are broadcast then the HRNN should be broadcasted in a separate SIB (i.e. different from SIB1).

RAN2#108

[CAG] In the UE on request of NAS, the AS shall scan all RF channels in the NR bands according to its capabilities to find available CAGs. On each carrier, the UE shall at least search for the strongest cell, read its system information and report available CAG ID(s) together with their HRNN (if broadcast) and PLMN(s) to the NAS. The search for available CAGs may be stopped on request of the NAS. If NAS has selected a CAG and provided this selection to AS, the UE shall search for an acceptable or suitable cell belonging to the selected CAG to camp on.

[SNPN] In the UE on request of NAS, the AS shall scan all RF channels in the NR bands according to its capabilities to find available SNPNs. On each carrier, the UE shall at least search for the strongest cell, read its system information and report available SNPN identifiers together with their HRNN (if broadcast) to the NAS. The search for available SNPNs may be stopped on request of the NAS.”

As agreed in RAN2#107 that the HRNN should be broadcast in a separate SIB (i.e. different from SIB1) and it is not suitable to include HRNN in any existing SIB, three companies (Nokia/ChinaTelecom/Huawei) propose that the HRNN should be broadcast in a new SIB.

**Q1a. Do companies agree that HRNN is broadcast in a new SIB?**

|  |  |  |
| --- | --- | --- |
| **Company name** | **Yes/No** | **Comments** |
| QC | Yes |  |
| CATT | Yes | it is not suitable to include HRNN in any existing SIB |
| Huawei | Yes |  |
| Nokia | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |
| Intel | Yes |  |

As agreed in RAN2#108, UE shall report the NPN identifiers together with their HRNN to NAS and it is worth considering how to associate the NPN identifiers broadcast in SIB1 and the HRNN broadcast in a separate SIB

Regarding the association between the NPN ID and the HRNN, companies’ views from contributions are summarized in Table 1.

|  |  |
| --- | --- |
| **Company** | **Views** |
| Ericsson  [0130] | Proposal 9: The SIB for HRNN shall have the same amount of HRNN elements as the number of CAGs and NIDs in SIB1. These elements can also be empty.  -- ASN1START  -- TAG-SIBx-START  SIBx ::= SEQUENCE {  hrnn-List SEQUENCE (SIZE (1.. maxNPN-r16) OF HRNN  ...  }  HRNN ::= CHOICE {  hrnn OCTET STRING (size (1..48)),  noHRNN ENUMERATED {true}  }  -- TAG-SIBx-STOP  -- ASN1STOP |
| Nokia, Nokia Shanghai Bell  [0401] | Proposal 6: RAN2 specifies a new optional SIB for HRNNs using indexing references to the NPNs listed in SIB1. It is proposed to adopt the corresponding text proposal of Annex A.6.  -- ASN1START  -- TAG-SIBX-START  SIBX-r16 ::= SEQUENCE {  humanReadableNameListNPN-r16 SEQUENCE (SIZE (1..maxHumanReadableName-r16)) OF HumanReadableNameInfo-r16,  ...  }  HumanReadableNameInfo-r16 ::= SEQUENCE {  npn-IdentityIndex-r16 INTEGER (1..maxNPN),  humanReadableName-r16 OCTET STRING (SIZE(1..FFSvalue)),  ...  }  -- TAG-SIBX-STOP  -- ASN1STOP |
| ZTE, Sanechips,  Qualcomm  [0668] | Proposal 1: For the association between HRNN and the network ID, the following 3 options can be considered:  Option 1: Associate the HRNN and Network ID with explicit Index  Option 2: Associate the HRNN and the Network ID with an explicit Bitmap  Option 3: Associate the HRNN and the Network ID implicitly  Proposal 2: The option 3 can be taken as a baseline for the further discussion.  -- ASN1START  -- TAG-SIB10-STARTu  SIB10 ::= SEQUENCE {  humanReadableNameList HumanReadableNameList OPTIONAL, -- Need R  lateNonCriticalExtension OCTET STRING OPTIONAL,  ...  }  HumanReadableNameList ::= SEQUENCE (SIZE (1..maxNPN)) OF HumanReadableName  HumanReadableName ::= SEQUENCE {  humanReadableName OCTET STRING(SIZE(1..maxHRNNLen)) OPTIONAL -- Need R  }  -- TAG-SIB10-STOP  -- ASN1STOP |
| China Telecom, Huawei, HiSilicon  [1585] | Proposal 1: The HRNN for the NPN is broadcasted in a specialized SIB.  Proposal 2: Only the HRNN(s) together with the simplified information of the corresponding PLMN ID(s) and NID(s)/CAG ID(s) are provided in the specialized SIB. |

The above proposals can be categorized into the following two options:

* Option A: Associate the HRNN and Network ID with explicit Index.

-- ASN1START

-- TAG-SIBX-START

SIBX-r16 ::= SEQUENCE {

humanReadableNameListNPN-r16 SEQUENCE (SIZE (1..maxHumanReadableName-r16)) OF HumanReadableNameInfo-r16,

...

}

HumanReadableNameInfo-r16 ::= SEQUENCE {

npn-IdentityIndex-r16 INTEGER (1..maxNPN),

humanReadableName-r16 OCTET STRING (SIZE(1..FFSvalue)),

...

}

-- TAG-SIBX-STOP

-- ASN1STOP

* Option B: Associate the HRNN and the Network ID implicitly. The SIB for HRNN shall have the same amount of HRNN elements as the number of CAGs and NIDs in SIB1. These elements can also be absent.

-- ASN1START

-- TAG-SIB10-STARTu

SIB10 ::= SEQUENCE {

humanReadableNameList HumanReadableNameList OPTIONAL, -- Need R

lateNonCriticalExtension OCTET STRING OPTIONAL,

...

}

HumanReadableNameList ::= SEQUENCE (SIZE (1..maxNPN)) OF HumanReadableName

HumanReadableName ::= SEQUENCE {

humanReadableName OCTET STRING(SIZE(1..maxHRNNLen)) OPTIONAL -- Need R

}

-- TAG-SIB10-STOP

-- ASN1STOP

**Q1b. With regards to the association between network ID and the HRNN, which option do companies prefer? If companies would like to propose another option different from option A and option B, please add detailed descriptions in the “comments” column.**

|  |  |  |
| --- | --- | --- |
| **Company name** | **Option A/B/other** | **Comments** |
| QC | B | Option B seems sufficient. |
| CATT | B | This is the straightforward method without introducing extra overhead for the new SIB |
| Huawei | No strong view |  |
| Nokia | A | We think that this is cleaner way if no HRNN is provided for all NPNs. |
| Lenovo | A | It looks safer and avoids sending empty entries. |
| Ericsson | B | The B approach has been used in similar situations before. |
| Intel | Option B | We do not have strong view either way but thought Option B is more efficient from a signaling point of view. |

## **Key Issue2- UAC for SNPN and CAG**

For the PLMN network, the unified access control is adopted and the *uac-BarringInfo* can be defined per PLMN in SIB1. For CAG and SNPN, six contributions have been submitted about configuration and handling of UAC. The proposals from contributions submitted at RAN2#109e are summarized in Table2:

|  |  |
| --- | --- |
| **Company** | **Views** |
| Nokia, Nokia Shanghai Bell  [0401] | Proposal 4a: Extend the procedure description in clause 5.3.14.2 that UAC parameters can be NPN specific. It is proposed to adopt the corresponding text proposal of Annex A.4a.  Proposal 4b: Clarify in the description of *UAC-BarringPerPLMN-List* that *the plmn-IndentityIndex* may refer to a NPN. It is proposed to adopt the corresponding text proposal of Annex A.4b. |
| ZTE,  Qualcomm  [0668] | Proposal 3: The UAC of the SNPN shall be defined per SNPN ID for the network sharing scenario.  Proposal 4: For the SNPN UAC configurations, two options can be considered:  Option A: Include the SNPN UAC in the legacy *uac-BarringInfo*.  Option B: Extend a new SNPN UAC list as a non-critical extension to SIB1.  Proposal 6: CAG ID level access control is not supported, the UE execute the access control for the CAG cell based on the related PLMN. |
| Intel  [1169] | Proposal#1: Existing UAC associated to the PLMN of a CAGID can be reused for PNI-NPN based on operator-defined access categories.  Observation#1: UAC is applicable to SNPN and some extensions to the ASN.1 signaling on the UAC configuration are needed to include the NID or there should be some implicit approach to index the SNPN.  Proposal#2: The network index in UAC per PLMN can be defined as follow:   * The indexing of the network in the *UAC-BarringPerPLMN-List* should follow first from the *PLMN-IdentityInfoList* and then follow by the *NPN-IdentityInfoList-r16* * If network occurs in the *PLMN-IdentityInfoList* and the *NPN-IdentityInfoList-r16* occurs multiple times in both list for PLMN network or PLMN with CAGID, the first one to occur in both lists are indexed. |
| Huawei, HiSilicon  [1376] | Proposal 2: RAN2 to consider SNPN specific UAC scheme by extending the index of plmn-IdentityIndex IE to indicate the related PLMN ID and NID across the npn-IdentityInfoList fields included in SIB1. |
| CMCC  [1430] | Proposal 1: existing mechanisms defined for Control Plane load control, congestion and overload control can be re-used, as well as the Unified Access Control using the access categories can be re-used for SNPN/CAG.  Proposal 2: it is straightforward to add a separate *uac-BarringInfo* per SNPN, e.g. *UAC-BarringPerSNPN-List*.  Proposal 3: the *uac-BarringInfo* for CAG is suitable to be located with the *UAC-BarringPerPLMN-List* as public cell, and related parameters can be re-used. |

With regards to the granularity of the UAC configuration for CAG, five companies share considerations and the proposals can be categorized as follows:

* Option A: The UAC parameters should be configured per CAG, which means NW may configure different *uac-ImplicitACBarringList* / *uac-ExplicitACBarringList* for each CAG.
* Option B: The parameters should be configured per PLMN by reusing the existing UAC, which means NW may only configure different *uac-ImplicitACBarringList* / *uac-ExplicitACBarringList* for each PLMN. For CAGs associated with the same PLMN ID, the same *uac-ImplicitACBarringList* / *uac-ExplicitACBarringList* applies.

**Q2. What is the granularity of the UAC configuration for CAG? Per CAG or per PLMN?**

|  |  |  |
| --- | --- | --- |
| **Company name** | **Per CAG or per PLMN** | **Comments** |
| QC | Per PLMN |  |
| CATT | Per PLMN | CAG ID level access control is not necessary as the different CAG IDs under the same PLMN are deployed by the same operator |
| Huawei | Per PLMN |  |
| Nokia | Per CAG ID | As the network (including the NG-RAN) is not aware of the selected CAG ID, no CAG ID specific load or congestion control mechanism can be performed by the network. UAC is performed by the UE based on parameters advertised in the cell. Therefore, our view is that UAC is the tool that an operator can use for CAG ID specific load and congestion control. Note that enabling CAG ID specific UAC parameters does not mean that an operator shall advertise CAG IDs specific UAC parameters. Our view is that this is in principle required by SA2. We think that an LS to SA2 can help to clarify this issue. |
| Lenovo | Per PLMN | We think that a CAG-ID based access control addresses a very specific deployment scenario where CAG UEs are configured with a single or very few CAG-IDs. But we consider such scenario as an optimization which need not to be supported in Rel-16. |
| Ericsson | Per PLMN |  |
| Intel | Per PLMN | The access control for CAG should be done per PLMN and further control can be done via user defined access category as specified by SA2:  In order to prevent access to NPNs for authorized UE(s) in case of network congestion/overload and if a dedicated S-NSSAI has been allocated for an NPN, the Unified Access Control can be used using the operator-defined access categories with access category criteria type (as defined in TS 24.501[47]) set to the S-NSSAI used for an NPN. |

For SNPN, six companies share understanding and all of them propose that the UAC parameters should be configured per SNPN.

**Q3a. Do companies agree that the UAC parameters should be configured per SNPN?**

|  |  |  |
| --- | --- | --- |
| **Company name** | **Yes/No** | **Comments** |
| QC | Yes |  |
| CATT | Yes | Considering that the SNPN network is deployed independently, and that the NG-RAN may be shared by multiple SNPNs, it is necessary to configure the UAC parameter per SNPN |
| Huawei | Yes |  |
| Nokia | Yes | Similar case as with PLMNs. |
| Lenovo | Yes |  |
| Ericsson | Yes |  |
| Intel | Yes |  |

If the answer to Q3a is “Yes”, companies are invited to share views on how to capture that. Among the contributions submitted in RAN2#109e, five companies propose that the UAC parameters of the SNPN should be configured per SNPN by reusing the existing *uac-BarringPerPLMN-List* (Nokia/ZTE/Qualcomm/ Intel/Huawei) while one company propose to introduce a separate list, e.g. *UAC-BarringPerSNPN-List* (CMCC), for SNPN.

* Option A: The existing *uac-BarringPerPLMN-List* should reused to configure the UAC parameters per SNPN.
* Option B: A separate list, e.g. *UAC-BarringPerSNPN-List,* should be introduced.

**Q3b. Which option do companies prefer to configure UAC parameters per SNPN? Reuse the existing *uac-BarringPerPLMN-Lis*t or introduce a separate list, e.g. *UAC-BarringPerSNPN-List*?If companies would like to propose another option different from option A and option B, please add detailed descriptions in the “comments” column.**

|  |  |  |
| --- | --- | --- |
| **Company name** | **Option A/B/other** | **Comments** |
| QC | A | We think Option A is desired, unless some problems are identified with it. |
| CATT | A | It is straightforward method without changing asn.1 structure |
| Huawei | A | Option A minimizes the changes to Stage 3 spec. |
| Nokia | A | If RAN2 extends the indexing to SNPNs, then option A can work without any ASN.1 changes. |
| Lenovo | A |  |
| Ericsson | A |  |
| Intel | Option A | There is no need for a separate list, since we have limit the number of network combination {PLMN + CAG + SNPN} to 12. |

# Conclusion

***To be added.***

# References

1. R2-2001675 Summary of [PRN] Other (HRNN, Access Control, etc) ZTE Corporation, Sanechips
2. R2-2000130 Remaining RRC aspects of NPN Ericsson discussion Rel-16 NG\_RAN\_PRN-Core
3. R2-2000131 Remaining RRC aspects of NPN Ericsson draftCR Rel-16 38.331 15.8.0 B NG\_RAN\_PRN-Core
4. [R2-2000401](file://D://__会议\2020\3GPP_202002\TSGR2_109_e\Docs\R2-2000401.zip) Proposals on open RRC issues Nokia, Nokia Shanghai Bell discussion Rel-16 NG\_RAN\_PRN-Core
5. R2-2000668 Consideration on the HRNN and Access control ZTE Corporation, Sanechips, Qualcomm Inc discussion Rel-16 NG\_RAN\_PRN-Core
6. R2-2001072 Consideration on fixed MCC for SNPN vivo discussion R2-1916097
7. R2-2001155 UE-initiated change of NPN UE configuration Lenovo, Motorola Mobility discussion NG\_RAN\_PRN-Core
8. R2-2001169 Network indexing for UAC and Connection Control Intel Corporation discussion Rel-16 NG\_RAN\_PRN-Core
9. [R2-2001376](file://D://__会议\2020\3GPP_202002\TSGR2_109_e\Docs\R2-2001376.zip) General considerations on idle and inactive mode for NPN Huawei, HiSilicon discussion Rel-16 NG\_RAN\_PRN
10. R2-2001378 Considerations on SI Validity Checking Huawei, HiSilicon discussion Rel-16 NG\_RAN\_PRN
11. [R2-2001430](file://D://__会议\2020\3GPP_202002\TSGR2_109_e\Docs\R2-2001430.zip) Access and mobility control for NPN CMCC discussion Rel-16 NG\_RAN\_PRN-Core
12. R2-2001585 Discussion on human-readable network name China Telecom, Huawei, HiSilicon discussion Rel-16 NG\_RAN\_PRN-Core
13. R2-2001587 Discussion on the deployment for CAG China Telecom, Huawei, HiSilicon discussion Rel-16 NG\_RAN\_PRN-Core