3GPP TSG-RAN WG3 Meeting #114bis-e [R3-221105](file:///D:\My_work\TSGR1-108-eMeeting-20220110\RAN3-114bis\Inbox\R3-221105.zip)

Online, 17 – 26 January 2022

**Agenda item: 9.3.5.1**

**Source: Huawei (moderator)**

**Title: Summary of offline:** **Retrieve UE context for NPN only cell**

**Document for: Discussion and Decision**

# 1 Introduction

This paper summarizes the following email discussion:

**CB: # 95\_UEContextNPN**

**- Check the solutions from last meeting and try to converge on the solution, no matter in RAN3 or other group**

**- Close the topic in this meeting**

(HW - moderator)

Summary of offline disc [R3-221105](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20114bis\Inbox\Drafts\CB%20%23%2095_UEContextNPN\Inbox\R3-221105.zip)

# 2 For the Chair’s Notes

**Proposal 1: No need to involve with RAN2 with the given analysis.**

**Proposal 2: Down-select the two options at the next meeting.**

* **Option 2: Add a note “In case of NPN-only cell, it is assumed that SIB1 contains the same value included in the *CellIdentity* in the first entry of the *NPN-IdentityInfoList* also in the first entry of the *PLMN-IdentityInfoList*.”;**
* **Option 4: introduce a new NR CGI IE (including the first PLMN Identity and the first NR Cell Identity in SIB1) at Xn setup/RAN configuration update message.**

**Proposal 3: Note the R3-221277 (revision of R3-220684).**

To be continued at this basis.

# 3 Discussion (Phase 1)

Based on the online discussion, the following issue seems clear to all companies (also captured at the previous meeting):

**The issue is acknowledged: How could the anchor NG-RAN node acquires the PCI and ARFCN information based on the first PLMN Cell ID to calculate the target key in case of the NPN-only cell?**

Then we can go directly to the candidate solutions, and down-select solutions within RAN3 remit. And then we can close this topic at this meeting.

* **Option 1:** Include the PCI/AFRCN-DL in the **Retrieve UE Context Request** message as proposed in R3-215160;
* **Option 2**: In case of NPN only cells the SIB1 configuration should replicate the cell ID value of the second SIB1 PLMN entry into the first PLMN entry.
* **Option 3**: Update the procedure/semantics descriptions;
* **Option 4**: Introduce new indication at Xn setup/update procedures (either ***NR Cell Identity of First PLMN*** IE corresponding to the first PLMN Identity broadcasted in SIB1 or ***NR CGI*** IE including the cellIdentity corresponding to the first PLMN Identity and the first PLMN Identity in SIB1);
* **Option 5**: others, e.g., ask SA3 to update the security key generation in case of NPN only cell.
* ~~Option 6: Request RAN2 to use the cell corresponding to the first NPN Identity in SIB1 as the target physical cell.~~

The moderator intends to provide some initial analysis, based on the analysis in R3-220683

* The **first** option could work.
* The **second** option also could work. But this relies on the implementation (not defined in any specs), and this is not a standard solution. This cannot be always ensured by the inter-operation case. Importantly this solution has RAN2 impact: it mandates that NPN only cell broadcast the first cell identity in the *plmn-IdentityInfoList* the same as the first cell identity in the *npn-IdentityInfoList-r16*.
* The **third** option to update the semantic descriptions could not work. As given below, overall twelve PLMN/NIDs could be broadcasted. In case of an NPN-only cell, the first PLMN Identity is not considered as within the twelve PLMN/NIDs in the Broadcast PLMN Identity Info List NR IE.

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| --- | --- | --- | --- | --- | --- | --- |
| **Broadcast PLMN Identity Info List NR** |  | *0..<maxnoofBPLMNs>* |  | This IE corresponds to the *PLMN-IdentityInfoList* IE and the *NPN-IdentityInfoList* IE (if available) in *SIB1* as specified in TS 38.331 [8]. All PLMN Identities and associated information contained in the *PLMN-IdentityInfoList* IE and NPN identities and associated information contained in the *NPN-IdentityInfoList* IE (if available) are included and provided in the same order as broadcast in SIB1.  NOTE: In case of NPN-only cell, the PLMN Identities and associated information contained in the *PLMN-IdentityInfoList* IE are not included. | YES | ignore |

* The **fourth** option could work. And this issue can be resolved by RAN3 itself.
* The **fifth** option seems require other group involvement (e.g., SA3).

**Question 1: Please provide your preference for the above option(s), or any other solution.**

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| --- | --- |
| **Company** | **Comments** |
| Huawei | Both Option 4 and option 1 are fine to us.  For option 4, either the ***NR CGI*** IE or the ***NR Cell Identity of First PLMN*** IE is fine. |
| Qualcomm | Option 5 should be ruled out, this is the worst scenario (impact seriously other groups due to a RAN3 signalling or configuration issue).  Option 3 appears to be the equivalent of option 2 in the sense that any semantics would effectively point out what is used for security, and by implication what has to go in the dummy broadcast – so I think it can work but it is a bit hidden – but it feasible, and has the least impact.  Although option 2 has RAN2 impact, this is very minor as it has no impact on UE behaviour or any signalling. So not sure we should rule that out. The only concern here is that the problem is caused by a RAN3 decision.  Options 1 and 4 work. Of these two, option 4 may be preferred as it is based on configuration signalling. |
| E/// | We prefer Option 2. We could discuss whether Option 3 is needed, but Option 3 without Option 2 does not work.  We can further discuss whether the semantics description or text needs to be changed somewhere. Option 3 is only to see whether need to describe the rule in the description based on the understanding in Option 2.  Also Option 2 is reworded and now is more precise. |
| ZTE | We prefer Option 2. But in fact for option2 , we also need to involve RAN2. So we suggest to request RAN2 to check , e.g, whether option6 or option2 is more appropriate. |
| Nokia | Option 1 or option 4 are OK. |
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| Moderator Summary:   * Overall two options can be further considered at the 2nd round (option 4 vs. option 2+3) * Three companies are in favour of option 4, while two companies prefer option 2. * Please see the 2nd discussion with more analysis. | |

# 4 Discussion (Phase 2)

The moderator copies the following options below (Note that option 2 could possibly need to update the semantic descriptions (i.e. option 3), which can be discussed later).

* **Option 2**: In case of NPN only cells the SIB1 configuration should replicate the cell ID value of the second SIB1 PLMN entry into the first PLMN entry.
* **Option 4**: Introduce new indication at Xn setup/update procedures (either ***NR Cell Identity of First PLMN*** IE corresponding to the first PLMN Identity broadcasted in SIB1 or ***NR CGI*** IE including the cellIdentity corresponding to the first PLMN Identity and the first PLMN Identity in SIB1);

For this **option 2**, below provides an example:

* Consider a NPN(CAG)-only cell which is shared by {PLMN A + CAG 1} and {PLMN B + CAG 2}. The SIB1 broadcast by this cell is shown below.

|  |  |
| --- | --- |
| **SIB1** | |
| PCI | 1 |
| cellReservedForOtherUse | TRUE |
| plmn-IdentityInfoList | * PLMN A, **Cell 102** |
| npn-IdentityInfoList | * PLMN A + CAG 1, **Cell 102** * PLMN B + CAG 2, Cell 103 |

There are several issues as follows.

* This option requires RAN2 involvement, e.g., to specify cell identity of the plmn-IdentityInfoList in SIB1. But this may have issues on the R16 legacy NG-RAN nodes.
* This options deviates the following principles listed in TS 38.300 and TS 23.501.

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| **In section** **4.6 Radio Access Network Sharing of TS 38.300:**   * In this version of the specification, a Cell Identity can only belong to one network type among PLMN, PNI-NPN or SNPN as defined in TS 23.501 [3].   **In section 5.18 Network Sharing of TS 23.501:**  In all non-public network sharing scenarios, each Cell Identity as specified in TS 38.331 [28] is associated with one of the following configuration options:  - one or multiple SNPNs;  - one or multiple PNI-NPNs (with CAG); or  - one or multiple PLMNs only. |

The moderator tends to propose no need to involve RAN2, with the following proposal.

**Proposal 1: no need to involvement with RAN2 with the analysis above.**

**Proposal 2: Agree the option 4: introduce a new NR CGI IE (including the first PLMN Identity and the first NR Cell Identity in SIB1) at Xn setup/RAN configuration update.**

**Proposal 3: Agree the R3-22xxxx (revision of R3-220684) (see it in the draft box).**

Please provide any view / comments on this topic and the question in bold below:

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| --- | --- | --- |
| Company | Comment | |
| Huawei | Yes. | |
| Nokia | OK. This is also our prefreed. | |
| E/// | Disagree. We don’t agree with the above points against Option 2.  UEs looking at the first entry in SIB1 is the reason why on Xn we exchange the whole list of broadcast information to let the peer node at context retrieval know what the first entry is, if it happens that the new NG-RAN node does not serve the PLMN that is associated with the first cell-id entry.  If there is any issue with such “principle”, then we would have issues with RRC\_INACTIVE resume in case of RAN sharing with multiple Cell ID broadcast. | |
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| Moderator Summary:   * Still there are two camps about the option 2 and option 4. Then the down-selection can be further decided at the next meeting. | |

# 5 Conclusions, Recommendations

TBD

# References

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| [R3-220683](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20114bis\Inbox\Drafts\CB%20%23%2095_UEContextNPN\Docs\R3-220683.zip) | Retrieve UE context for NPN only cell (Huawei, Deutsche Telekom, Orange) | Discussion  Nok: Do not you need to add NCGI instead of CID? Another option is to update in TS33.501?  ZTE: No impact on RAN3, it can be discussed in RAN2  CATT: Prefer to let RAN2 check the issue  E///: Prefer to use option2  Qualcomm: Can work on dummy value solution and prefer to discuss this in RAN3  **CB: # 95\_UEContextNPN**  **- Check the solutions from last meeting and try to converge on the solution, no matter in RAN3 or other group**  **- Close the topic in this meeting**  (HW - moderator)  Summary of offline disc [R3-221105](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20114bis\Inbox\Drafts\CB%20%23%2095_UEContextNPN\Inbox\R3-221105.zip) |
| [R3-220684](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20114bis\Inbox\Drafts\CB%20%23%2095_UEContextNPN\Docs\R3-220684.zip) | Retrieve UE context for NPN only cell (Huawei, Deutsche Telekom, Orange) | CR0734r, TS 38.423 v16.8.0, Rel-16, Cat. F |