**3GPP TSG-RAN WG2 Meeting #110e R2-2005804**

**1 – 12 June 2020**

**Agenda item: 6.18.2**

**Source: Nokia (Rapporteur)**

**Title: Report from email discussion [AT110e][104][PRN] RRC CR (Nokia) – 2nd round**

**WID/SID: NG\_RAN\_PRN-Core - Release 16**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report about second round of the following email discussion

* [AT110e][104][PRN] RRC CR (Nokia)

Initial scope: Continue the discussion on RRC open issues, based on [R2-2004481](file:///C:\Data\3GPP\RAN2\Docs\R2-2004481.zip), considering the new LSs from SA1 and the proposals marked "to be discussed in offline [104]". Also discuss RILs: Z112, B200 and H422.

Initial intended outcome: summary of the offline discussion with e.g.:

* Set of proposals with full consensus agreeable over email (based on the list in Section 3.1 of [R2-2004481](file:///C:\Data\3GPP\RAN2\Docs\R2-2004481.zip), possibly extended with new easy agreements)
  + - Set of proposals to discuss in the follow up conference call

Initial deadline (for companies' feedback): Wednesday 2020-06-03 10:00 UTC

Initial deadline (for rapporteur's summary in [R2-2005794](file:///C:\Data\3GPP\RAN2\Inbox\R2-2005794.zip)): Wednesday 2020-06-03 22:00 UTC

Updated scope: Continue the discussion on the issues marked as "Continue during the second round of offline [104]" and update the RRC CR with all meeting agreements

Updated intended outcome:

* Summary of the offline discussion (with set of proposals with full consensus agreeable over email and with set of proposals to discuss online)
* Updated version of the RRC CR

Deadline for companies' feedback on open issues: Monday 2020-06-08 12:00 UTC

Deadline for rapporteur's summary in R2-2005804: Tuesday 2020-06-09 00:00 UTC

Proposed agreements in R2-2005804 not challenged until Tuesday 2020-06-09 12:00 UTC will be declared as agreed by the session chair. For the remaining open issues (if any) the discussion will continue online.

# 2 Discussion of open issues

## 2.1 Issue 1: Network indexing for NPNs

**Open issue description:** A definition of network indexing for NPNs is FFS

The following was agreed

1. The PNI-NPNs belonging to the same PLMN have a common (shared) index value.

During the 1st round of the email discussion (issue 4 of R2-2005794) it was not concluded

1. Whether the network should be aware that the UE is accessing the cell as PLMN cell or as a PNI-NPN cell, in other words whether UE should indicate to the network that the UE is accessing the cell as PLMN cell or as a PNI-NPN cell
2. Whether the PLMN and PNI-NPNs with the same PLMN ID share an index or not

Rapporteur's comments:

1. Answer to b) should be a consequence of the answer to a), as using separate network index for the PLMN is in implicit indication that the UE is accessing the cell as PLMN cell or as a PNI-NPN cell.
2. During the discussion whether UE should indicate to the network that the UE is accessing the cell as PLMN cell or as a PNI-NPN cell the SA3 LS in [S3‑194559](https://www.3gpp.org/ftp/TSG_SA/WG3_Security/TSGS3_97_Reno/docs/S3-194559.zip" \t "_blank) should also be considered: "In case SA2 decides, the CAG ID is needed to be sent by the UE in the AS or NAS layer, then SA3 would require it to be sent in a protected manner."

**Question 1: Do you agree that the network should be aware that the UE is accessing the cell as PLMN cell or as a PNI-NPN cell and thus the UE should indicate to the network that the cell accessed as PLMN cell or as a PNI-NPN cell?**

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| **Company** | **Answer** | **Comment** |
| Ericsson | Y, but that is already ensured.. see comment | From 23.501:  In all non-public network sharing scenarios, each Cell Identity 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.  Hence it is not possible to mix normal PLMNs and CAGs on the same cell ID.  And we assume that there is a one-to-one mapping between cell IDs and the indices which the UE reports in Msg5.  Hence the network will know if the UE connects to a PLMN or a PNI-NPN. |
| Huawei | Y | From RAN3 perspective, the AMF needs to know the supported CAG list of the cell and the allowed CAG list of the UE. By comparing the two lists, the AMF can verify the access of the UE. But the verification process is only needed if the UE is accessing through CAG.  It was agreed in R3-197776 that, the gNB transmits the supported CAG List of the selected PLMN of the selected cell via the Initial UE Message to AMF for further admission control.  However, there is no need for the gNB to transmit the supported CAG List to AMF when the UE (e.g., PLMN UE) is not requesting to access via CAG cell.  Some comments to Ericsson’s response:  “Hence it is not possible to mix normal PLMNs and CAGs on the same cell ID” depends on the conclusion of Question b.  If PLMN and PNI-NPNs with the same PLMN ID share an index, the index in MSG5 can be mapped to both PLMN and PNI-NPNs. |
| CATT | Y | But PNI-NPNs with same PLMN ID share an separate index is sufficient, no explicit indicator is needed |
| Nokia | No | The access control and the mobility control (e.g. target cell selection) is based on allowed CAG list and CAG-only indication, there is no difference whether a UE selects a cell as PLMN or a CAG cell when both possible. The indication that a UE accesses a cell a CAG cell may bring up the security issues mentioned in the SA3 LS; e.g. this is an implicit CAG ID indication if the cell only supports a single CAG ID for the selected PLMN. |
| ZTE | Y | We agree with Ericsson that there should be a one to one mapping between cell IDs and the indices which UE reports in Msg5.  Thus, we prefer PNI-NPNs with same PLMN ID share an index and the sharing does not involve PLMNs. In this way, RAN can also decide whether to provide the NPN Access Information in Initial UE Message or not.  An additional indicator should be avoided. |
| vivo | Y | Assumed the PLMN and PNI-NPNs with the same PLMN ID share the same index, NW cannot know whether UE is accessing via PLMN or PNI-NPN or not if no explicit indicator is provided by UE. |
| Intel | No | Only PLMN ID needs to be known to the network for AMF solution. Furthermore, if a separate index is used for the CAG associated with the same PLMN, it may result in overhead in the UAC configuration in SIB1 as the network may have to indicate the same UAC configuration for the same PLMN.  There needs to be a requirement to allow this from the network side |
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## 2.2 Issue 2: CAG specific PCI list

**Open issue description:** The content of the CAG specific PCI lists is not fully clarified

The following was agreed

1. Only cells supporting CAG(s), including CAG only cells and shared CAG cells, may be listed in the new CAG PCI lists (can come back to this if we find some issues)

It remained open whether the network shall list PCI ranges for all cell supporting CAGs or not.

Rapporteur's comment: the content of the list has impact to the UE cell reselection behaviour specified in 38.304.

**Question 2.1: Do you agree that the PCI ranges listed in CAG PCI lists shall include PCI values of all neighbouring cells supporting CAG(s) (for the given PLMN and frequency band)?**

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| **Company** | **Answer** | **Comment** |
| Ericsson | - | It would be good to get an operator's input on this whether it is feasible to assume that an operator would be able to, with certainty, ensure that all PCIs are included or not. |
| Huawei | Yes | In our understanding, the reserved PCIs are used to save some UE effort.  If the UE considers the listed PCIs as including “all” neighbour cells supporting CAG, then CAG capable UEs would only need to measure the listed PCIs; otherwise, UE still needs to measure other PCIs, and the reserved PCI list looks somewhat useless.  The wording “all” is from UE perspective, the PCI list is something that the network would like the UE to assume to be the exhaustive list. We don’t think it serves as a restriction to the network. |
| CATT | Yes | Agree with Huawei. PCI range will be useless if not all CAG cells are included in the PCI range. |
| Nokia | Yes | If all CAG cells use a PCI in the ranges listed in CAG PCI lists then CAG-only UEs may use this information not to select cells whose PCI is not the indicated PCI list ranges. |
| ZTE | - | We do not think “all’’ is needed.  If the CAG PCI range is provided ( it can be a complete set or a subset), UE should measure these cells first before looking at other cells, which is always helpful to UE.  Even if NW provides “all” the CAG cells to UE, CAG UE is still allowed to measure other cells which is not included in this PCI range if UE cannot find any suitable cell from the list.  In our understanding, the expected UE behavior is the same (i.e. UE look at these cells first before checking other cells) w/o the “all”, we cannot see any benefits in having it.  Or do any companies prefer to have “all” and specify that CAG UE shall not look at any other cells outside this list? |
| vivo | Yes | The intention of introducing the reserved PCIs is to save UE power consumption when they perform cell selection. Thus, it is better to let CAG UE (especially for CAG only UE) know all the neighbour cells supporting CAG. |
| Intel | Yes, but | The intention is to include all the possible PCI values that are used in a frequency carrier. but these PCI values do not need to be just neighbour cells and maybe for the whole PLMN for the frequency. |
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RIL Z112 is connected to CAG specific PCI list:

| *SIB3* field descriptions |
| --- |
| ***intraFreqBlackCellList***  List of blacklisted intra-frequency neighbouring cells. |
| ***intraFreqCAG-CellList***  List of intra-frequency neighbouring CAG cells per PLMN. |
| ***intraFreqNeighCellList***  List of intra-frequency neighbouring cells with specific cell re-selection parameters. |
| ***intraFreqWhiteCellList***  List of whitelisted intra-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4. |
| ***q-OffsetCell***  Parameter "Qoffsets,n" in TS 38.304 [20]. |
| ***q-QualMinOffsetCell***  Parameter "Qqualminoffsetcell" in TS 38.304 [20]. Actual value Qqualminoffsetcell = field value [dB]. |
| ***q-RxLevMinOffsetCell***  Parameter "Qrxlevminoffsetcell" in TS 38.304 [20]. Actual value Qrxlevminoffsetcell = field value \* 2 [dB]. |
| ***q-RxLevMinOffsetCellSUL***  Parameter "QrxlevminoffsetcellSUL" in TS 38.304 [20]. Actual value QrxlevminoffsetcellSUL = field value \* 2 [dB]. |
| ***ssb-PositionQCL***  Indicates the QCL relationship between SS/PBCH blocks for a specific intra-frequency neighbor cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the value signalled by *ssb-PositionQCL-Common* in *SIB2* for the indicated cell. |

**Question 2.2: Do you agree of adding a reference to TS38.304 for CAG cell definition as proposed in RIL Z112?**

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| **Company** | **Answer** | **Comment** |
| Ericsson | Y |  |
| Huawei | Y |  |
| CATT | Y |  |
| Nokia | YES | Adding the reference will align the specification with the agreement "Only cells supporting CAG(s), including CAG only cells and shared CAG cells, may be listed in the new CAG PCI lists" |
| ZTE | Yes |  |
| vivo | Y |  |
| Intel | Y |  |
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# 3 Discussion of the additional proposals

## 3.1 Proposal 1 of [R2-2004572](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004572.zip)

[**R2-2004572**](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004572.zip)Proposal 1: The validity area of the PCI range can be the entire PLMN.

**Question 3.1: Do you agree with the proposal?**

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| **Company** | **Answer** | **Comment** |
| Ericsson | ? | Not sure what is the intended spec impact of the proposal. We think current spec doesn’t need to be changed? |
| Huawei | No | Currently the reserved PCI is used to facilitate UE measurements and the UE is not asked to have specific actions based on the reserved PCI. If UE wants to store the PCI range for other cells of the same PLMN, it is left to UE implementation.  We also think the current spec doesn't need to be changed. If the intention is to add a special validity area for PCI range in the spec, then we think it’s unnecessary. |
| CATT | No | The range of PCI is (0..1007),that means a PCI value may be reused in different area within a PLMN. Therefore a configured PCI range in a cell cannot be applicable to all the places in the entire PLMN |
| Nokia | NO | The PCI ranges for CAGs in the SIBs should have same validity as other SIB parameters (e.g. determined by areascope). |
| ZTE |  | Usually, UE does not use the system information from previous cell after moving to another cell. That is to say, the validity area for system information is usually within the scope of a cell.  The intention of this proposal is to clarify whether UE is allowed to use the CAG PCI range received from a previously camped cell after moving to another cell who is not broadcasting CAG PCI range.  If companies think the proposal is a little bit vague, we can change into the following:  *UE is allowed to apply the CAG PCI range after moving to another cell who does not broadcast the CAG PCI range.* |
| Intel | Yes | This can be added to the field description for the PCI range list. The network then does not have to broadcast the PCI range list in every cell. |
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## 3.2 Proposals 2 and 3 of [R2-2005148](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005148.zip)

[**R2-2005148**](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005148.zip)

* Proposal 2: RAN2 to discuss if this is the common understanding that there is no associated UE behaviour defined for a CAG capable UE for PCI range.
* Proposal 3: RAN2 to discuss that if the IE cellReservedForOtherUse=true condition is added to the definition of CAG cell then non-CAG capable UE “may” ignore the cells in the PCI range

**Question 3.2: Do you agree with the proposals?**

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| **Company** | **Pr 3** | **Pr 2** | **Comment** |
| Ericsson |  |  | P2: We think RAN2 will not specify this behavior in detail. We can specify what the CAG-list is supposed to include, but not if/how the UE uses it. **Disagree**.  P3: With the agreed definition of the PCI-range, we think a non-CAG UE **cannot** exclude the PCIs in the PCI-range. **Disagree** |
| Huawei | N | Y | P3: UE does not know the *cellReservedForOtherUse* of neighour cells unless it tries to acquire the SIB1, which takes place when the UE determines the target cell for reselection. So proposal 3 is not feasible.  P2: We agree that how the UE utilizes the PCI range is left to UE implementation. |
| CATT | No | No | P2: according to Rapporteur's comment in Issue 2,the content of the list has impact to the UE cell reselection behaviour specified in 38.304.  P3: we should not mix up CAG cell and CAG only cell. |
| Nokia | NO | NO | Pr2: The cell reselection principles should not be changed due to these lists. Whether a CAG UE uses the lists to optimize cell reselection is up-to UE implementation.  Pr3: According to agreement, the list can include shared cells that may be selected by non-CAG UEs. |
| ZTE | No | No | P2: How UE use such information can be left to implementation.  P3: This is proposal is not needed since we have already agreed that both CAG only cells and shared cells are included. |
| vivo | No | No | P2: Disagree.we prefer that how the UE use thre PCI range is left to UE implementation  P3: Disagree. An NPN-capable UE determines that a cell is NPN-only Cell by detecting that the cellReservedForOtherUse IE with true and the presence of the npn-IdentityInfoList IE. if the IE cellReservedForOtherUse=true condition is also added to the definition of CAG cell, there is nothing different between CAG only cell and CAG cell. |
| Intel | No | Yes | P2: Agree with the understanding that the PCI range usage is not defined and is left to UE implementation  P3: Disagree. Not needed. |
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## 3.3 Proposal 1 of [R2-2005689](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005689.zip)

[**R2-2005689**](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005689.zip)Proposal 2: UE may use knowledge of the CAG PCIs to improve implementation dependent search procedures for CAGs.

**Question 3.3: Do you agree with the proposal?**

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| **Company** | **Answer** | **Comment** |
| Ericsson | Y | The PCI-range is to help the UE. The UE may use it if it wants. |
| Huawei | Y | How the UE utilizes the PCI range is left to UE implementation. |
| CATT | Y | Agree with Ericsson and HW, it is up to UE implementation, no any impact to spec |
| Nokia | YES | This does not require changes in the specification. |
| ZTE | Yes | No changes in spec is needed. |
| vivo | Y | How the UE uses the PCI range when they perform measurement is left to UE implementation. |
| Intel | Yes |  |
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## 3.4 Proposal 1 of [R2-2004743](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004743.zip)

[**R2-2004743**](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004743.zip)Proposal 1: For NPN-only cell, the *plmn-IdentityInfoList* is not reported

**Question 3.4: Do you agree with the proposal?**

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| **Company** | **Answer** | **Comment** |
| Ericsson | No? | Is this not only an optimization to try to reduce signaling of the CGI-report? |
| Huawei | No strong view | It helps to save the overhead for “dummy PLMN”, but the gain is not significant. |
| CATT | Yes | plmn-IdentityInfoList is invalid in NPN-only cell,not need to report it to NW. |
| Nokia | NO | Non-CAG UEs will report about it. To get a consistent report about neighbouring cells (e.g. for ANR) it is better if all UEs include it. |
| ZTE | No | Reporting CGI is used for the following two purposes:  (1)ANR: Report the neighbour cells and build neighbour cell relation in the serving cell.  => report the legacy PLMN list in which a special PLMN is included is helpful for the serving cell to identify a neighbour NPN only cell.  (2)Solve PCI confusion at network side.  => The dummy PLMN in the legacy list is also helpful to solve the PCI confusion at the network side.  If the UE is NPN capable and can report the NPN list to solve PCI confusion, it is fine not to report the legacy PLMN list as the network can solve PCI confusion based on the reported NPN list.  If the UE is non-NPN capable, reporting the dummy PLMN in the legacy list is the only way to solve the PCI confusion at the network side as UE is not able to read and report the NPN list. |
| vivo | Yes | In the current spec, the plmn-IdentityInfoList IE is absent for CGI reporting when the concerned cell is a NSA cell. Under this case, UE report the *noSIB* IE instead. For NPN only cell, if the plmn-IdentityInfoListn IE is absent for CGI reporting, NW can aware the concerned cell is a NPN-only cell by detecting the presence of plmn-IdentityInfoList field  We agree that non-capable UE will always report the plmn-IdentityInfoList IE as they can identify whether a cell is NPN-only cell or not. But for NPN capable UE, allowing UE not to report the plmn-IdentityInfoList field of a NPN only cell will save some reporting overhead (i.e six octs). |
| Intel | No | This is an optimisation and this may mean that UE needs to decode the PLMN list to know whether it is dummy and filter it out. |
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## 3.5 Proposal 1 of [R2-2005593](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005593.zip)

[**R2-2005593**](http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005593.zip)Proposal 1: The following solutions for network controlled manual CAG selection should be discussed:

* Option 1: The CAG cell broadcasts a new indication to indicate whether a CAG-ID supported by the cell can be selected manually, and the new indication can be include in SIB1 or SIB10.
* Option 2: The UE is pre-configured with an allowed manually selected CAG list, which contains the CAGs that the UE is allowed to select manually.
* Option 3: UE reports that the access is based on manual CAG selection in RRC message.

Rapporteur's comment: Proposal is Option 1 is covered by the following agreement:

1. Solution B (in R2-2005794, Section 2.5) will be used as baseline for indicating if it is allowed to manually select a CAG-ID supported by the CAG cell but outside the UE’s allowed CAG list.

**Question 3.2: Do you agree with the proposal in Option 2 and/or in Option 3?**

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| --- | --- | --- | --- |
| **Company** | **Option 2** | **Option 3** | **Comment** |
| Ericsson | No | No | O2: It has been agreed that the NW can indicated whether manual CAG selection is allowed or not. We don’t think that O2 would be necessary in addition to this.  O3: We think the gNB doesn’t need to know this. |
| Huawei |  |  | As the proponent, the proposal was before receiving SA1 reply LS. Now that SA1 has decided that the indication is in system information and is per CAG ID and RAN2 has defined the solution, it’s ok not pursue Option 2 and Option 3. |
| Nokia | NO (out of scope of RAN2) | NO | O2: This is not in the scope of RAN2 as CAG selection is performed by NAS.  O3: There is no need for such a report, as access control happens based on the allowed CAG list and CAG-only indication in the network. |
| ZTE | No | No | No need to consider option 2/3 since option 1 has been selected by SA1. |
| vivo | No | No | CT1 has discussed the solutions for network controlled manual CAG selection and agreed to adopt the solution that the system information provides the indication of whether a CAG is allowed to manual CAG selection or not. |
| Intel | No | No |  |
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# 4 Conclusions

## 4.1 Proposals to be agreed over email

## 4.2 Proposals and issues to be discussed on-line