**3GPP TSG-RAN WG2 Meeting #109bis-e R2-20xxxxx**

**Electronic, 20 – 30 April 2020**

**Agenda item: 6.18.3**

**Source: Qualcomm (38.304 Rapporteur)**

**Title: Offline discussion 107: PRN 38.304 CR**

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

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report about the the following email discussion

* [AT109bis-e][107][PRN] 38.304 CR (Qualcomm)

Scope: Update the 38.304 CR, based on the progress on the remaining open issues

Intended outcome: In-principle agreed 38.304 CR

 Deadline for companies' feedback: Wednesday 2020-04-29 10:00 UTC

 Deadline for rapporteur's version for agreement: Thursday 2020-04-30 10:00 UTC

Status: Ongoing

To implement the agreements into 38.304, some aspects are straightforward, while others need input on the specific text to be used.

A draft CR is provided in the email discussion folder, and this document asks specific questions with respect to changes in the draft CR.

The following agreements are included in the discussion.

It was agreed via email discussion for 109-bis-e meeting that

(Proposal 7 from R2-2002659): The PRN rapporteur of 38.304 will create a documentation proposal for the following agreement: “For unlicensed spectrum and for a UE with non-empty allowed CAG list, if the highest ranked cell or best cell according to absolute priority reselection rules is a cell which is not suitable due to not broadcasting the selected/registered/equivalent PLMN, the UE with no empty allowed CAG list shall behave according to NR-U agreement.” as a part of the running CR.

It was agreed in the online session for 109-bis-e meeting that

* A Non-NPN-capable Rel-16 UE treats a cell with cellReservedForOtherUse=true as barred cell

It was agreed in the email discussion for 109-bis-e meeting that

* A Follow the NR-U agreement in unlicensed on the use of the IFRI flag (agreement is to be captured in TS 38.304):

- For the SNPN case, UE only follows the IFRI in MIB of a barred cell if the cell belongs to a SNPN which matches the registered SNPN of the UE. Otherwise the UE may select other cell in the same frequency

- For the CAG (PNI-NPN) case, there is no change to the existing NR-U behaviour: UE only follows the IFRI in MIB of a barred cell if the cell belongs to a registered/selected (e)PLMN. Otherwise the UE may select other cell in the same frequency.

Following was agreed in the email discussion for 10-bis-e meeting, but specific text for this agreement is excluded from discussion, as there is zero ambiguity on 38.304 implementation.

* “Remove the Editor’s Note: “It is FFS whether the above needs to capture the condition that the cell is “not reserved for operator use for UEs not belonging to AC 11 or 15” from Table 4.2-1 of 38.304.”

# 2 Main issue needing discussion (please comment)

## 2.1 Agreement on non-NPN-capable UEs to treat cell with cellReservedForOtherUse=true as barred cell

### 2.1.1 Issue 1 (Documentation of agreement)

It was agreed in the online session for 109-bis-e meeting that

* A Non-NPN-capable Rel-16 UE treats a cell with cellReservedForOtherUse=true as barred cell

Previously in 109-e, it has also been agreed that

* When a cell broadcasts any CAG IDs or NIDs, NPN-capable Rel-16 UE can treat the cell with cellReservedForOtherUse = true as a candidate during cell selection and cell reselection.

The current language in 38.304 relating to these issues is as follows:

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| When cell broadcasts any CAG IDs or NIDs and the cell status is indicated as "not barred" and "not reserved" for operator use and "true" for other use, and *cellReservedForFutureUse* IEis not indicated as "*true"*:- All UEs in SNPN AM or with non-empty Allowed CAG list shall treat this cell as candidate during the cell selection and cell reselection procedures.Editor's note: The applicability of above behaviour for non-NPN capable UE is FFS.When cell status is indicated as "true" for other use, and either cell does not broadcast any CAG-IDs or NIDs or does not broadcast any CAG-IDs and the UE is not operating in SNPN Access Mode,- The UE shall treat this cell as if cell status is "barred". |

Two options are given below

**Option 1 (direct translation of WG agreement)**

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| When cell broadcasts any CAG IDs or NIDs and the cell status is indicated as "not barred" and "not reserved" for operator use and "true" for other use, and *cellReservedForFutureUse* IEis not indicated as "*true"*:- All UEs in SNPN AM or with non-empty Allowed CAG list shall treat this cell as candidate during the cell selection and cell reselection procedures.When the cell status is indicated as "not barred" and "not reserved" for operator use and "true" for other use, and *cellReservedForFutureUse* IEis not indicated as "*true"*:* All UEs that are not capable of NPN functionality shall treat this cell as if cell status is "barred".

Editor’s note: The terminology “not capable of NPN functionality” needs further refinement, e.g. via UE capability, linkage to SNPN mode or other approach.When cell status is indicated as "true" for other use, and either cell does not broadcast any CAG-IDs or NIDs or does not broadcast any CAG-IDs and the UE is not operating in SNPN Access Mode,- The UE shall treat this cell as if cell status is "barred". |

**Option 2 (more consistent with 38.304 existing text)**

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| When cell broadcasts any CAG IDs or NIDs and the cell status is indicated as "not barred" and "not reserved" for operator use and "true" for other use, and *cellReservedForFutureUse* IEis not indicated as "*true"*:- All UEs in SNPN AM or with non-empty Allowed CAG list shall treat this cell as candidate during the cell selection and cell reselection procedures.When the cell status is indicated as "not barred" and "not reserved" for operator use and "true" for other use, and *cellReservedForFutureUse* IEis not indicated as "*true"*:* All UEs that are not in SNPN AM and not capable of CAG functionality shall treat this cell as if cell status is "barred".

Editor’s note: The definition of “not capable of CAG functionality” is FFS, e.g. via UE capability or via another approach.When cell status is indicated as "true" for other use, and either cell does not broadcast any CAG-IDs or NIDs or does not broadcast any CAG-IDs and the UE is not operating in SNPN Access Mode,- The UE shall treat this cell as if cell status is "barred". |

**Question 1: Which approach for 38.304 do you prefer to capture the agreement on emergency calls for non-NPN-capable UEs**

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| **Company** | **Preferred (1/2/Neutral/other)** | **Comment (please provide if selecting other)** |
| Huawei | Other | This is related to Issue 2. As indicated in Issue 2, “UE that is CAG capable but has empty allowed CAG list” should also be considered.We think in this context, the following UEs behave the same:1. UEs not capable of CAG functionality
2. CAG capable UEs with empty Allowed CAG list

Therefore, apart from what has already been captured (UEs in SNPN AM or with non-empty Allowed CAG list), all other UEs (not in SNPN AM and not CAG-capable, or, not in SNPN AM and with an empty Allowed CAG list) shall consider the cell as “barred”.We suggest to capture it as follows:When cell broadcasts any CAG IDs or NIDs and the cell status is indicated as "not barred" and "not reserved" for operator use and "true" for other use, and *cellReservedForFutureUse* IEis not indicated as "*true"*:- All UEs in SNPN AM or with non-empty Allowed CAG list shall treat this cell as candidate during the cell selection and cell reselection procedures, other UEs shall treat this cell as if cell status is "barred".~~Editor's note: The applicability of above behaviour for non-NPN capable UE is FFS.~~  |
| ZTE | Option 1 | 1. In general, we think option 1 is more consistent with the agreement.
2. For UE capable of CAG but has empty allowed CAG list, we think it can behave as other CAG capable UEs with non-empty allowed CAG list to override the “cellReservedForOtherse = true” since it can still read the CAG list and find out it can only camp on a CAG only cell for limited service. And we would suggest not to divide UE into too many categories to make the discussion more complicated.
3. Another option can also be considered to simplify the description a little bit. The agreements related to UE interpretation of *cellReservedForOtherUse* have been summarized below:
	* *cellReservedForOtherUse is used to prevent Rel-15 UEs to access the cell.*
	* *A Non-NPN-capable Rel-16 UE treats a cell with cellReservedForOtherUse=true as barred cell*
	* *For CAG-capable Rel-16 UE, emergency calls in a CAG-only cell can be supported by setting cellReservedForOtherUse=true and allowing the Rel-16 UEs to ignore this flag and access the PLMNs in the NPN list in limited service state.*

In our understanding, if network would like to allow emergency call for R15 UEs in a CAG only cell, network has to set the “*cellReservedForOtherUse= not true*” and all types of UE can get access at least for limited services.If network would like to bar all the other UEs and only allow the CAG member UEs to access, network can set the *cellReservedForOtherUse=true* and the R15 UE and R16 non-NPN capable UE will be barred according to the existing agreement. The only exception is the CAG capable UE who is not a member of the camped CAG cell(including a CAG capable UE with empty allowed CAG list), is still allowed to override the *cellReservedForOtherUse=true* and camp on a CAG only cell for limited service, based on the agreements we made so far. I think such concern has been raised also by QC in the email discussion109e#43 that category (a) and category (b) UE will have different behaviors based on the existing agreements.1. Rel-16 non-CAG-capable UE
2. Rel-16 CAG capable UE that is not a member of the CAG broadcast by CAG-only cell.

One proposed way forward is to revise the agreements we made for the R16 UEs into the following:*If UE is member of a NPN cell, it shall ignore the cellReservedForOtherUse=true. Otherwise, UE shall treat this cell as barred.*=> Actually I think the above sentence cover all the R15 and R16 UEs. But we will not change the agreed behavior of the R15 UE and R16 non-NPN capable UE since they will never be a NPN member. The above sentence will only change the agreed behavior of R16 CAG capable UE who is not a CAG member (including a CAG capable UE with empty allowed CAG list).=> In this way, the *cellReservedForOtherUse=true* can be used to bar all the non-CAG member UEs while still allow CAG member UE to camp on a CAG only cell for either limited service or normal service so that the service for a CAG member UE can be guaranteed to the most extent. => UE’s understanding on the *cellReservedForOtherUse=true* depends on whether it is a member of the concerned NPN cell rather than whether it can read NPN list or not.If we go for this simplified solution, we will capture the following:*When the cell status is indicated as "not barred" and "not reserved" for operator use and "true" for other use, and cellReservedForFutureUse IE is not indicated as "true":**-All UEs that are not NPN member shall treat this cell as if cell status is "barred".* |
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**Summary:**

### 2.1.2 Issue 2 (Need for further clarification)

The behaviour of in one specific case seems not yet covered by the existing 38.304 text and the text proposals above.

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| When cell status is indicated as "not barred" and "not reserved" for operator use and not "true" for other use and *cellReservedForFutureUse* IE is not indicated as"true",- All UEs shall treat this cell as candidate during the cell selection and cell reselection procedures.When cell broadcasts any CAG IDs or NIDs and the cell status is indicated as "not barred" and "not reserved" for operator use and "true" for other use, and *cellReservedForFutureUse* IEis not indicated as "*true"*:- All UEs in SNPN AM or with non-empty Allowed CAG list shall treat this cell as candidate during the cell selection and cell reselection procedures.Editor's note: The applicability of above behaviour for non-NPN capable UE is FFS. |

*Question: In the scenario above, what is the requirement for a UE that is CAG capable but has empty Allowed CAG list?*

Rapporteur observation: The agreements in RAN2 suggest that the clause above should also include “UE that is CAG capable but has empty allowed CAG list”

**Question 2**

**2a: Do you agree with the rapporteur observation for the Case above?**

**2b: Do you see need for 38.304 changes? One example of change is to replace “with non-empty Allowed CAG list” as “capable of CAG functionality”, but specific text can be discussed separately.**

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| **Company** | **3a (yes/no)** | **3b****(yes/no)** | **Comment (please provide if selecting other)** |
| Huawei | No | No | Agree to consider this case, but do not agree with the suggested change.We think in this context, the following UEs behave the same:1. UEs not capable of CAG functionality
2. CAG capable UEs with empty Allowed CAG list

Our suggested text is provided in Question 1. |
| ZTE | Yes | Yes | 1. Based on the existing agreement, CAG capable UE with empty allowed CAG list should still be considered as a CAG capable UE and the expected behavior is that UE override the “cellReservedForOtherse = true” since it can still read the CAG list and find out it can only camp on a CAG only cell for limited service.
2. As we mentioned under issue 1. Another simplified solution can also be considered with minor change to our agreements.
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# 3. Minor documentation issues (Reply optional)

## 3.1 Agreement on CAG and unlicensed spectrum

(Proposal 7 from R2-2002659): The PRN rapporteur of 38.304 will create a documentation proposal for the following agreement: “For unlicensed spectrum and for a UE with non-empty allowed CAG list, if the highest ranked cell or best cell according to absolute priority reselection rules is a cell which is not suitable due to not broadcasting the selected/registered/equivalent PLMN, the UE with no empty allowed CAG list shall behave according to NR-U agreement.” as a part of the running CR.

Following change in 38.304 is proposed (same as was proposed in the first version of PRN 38.304 running CR R2-2003421).

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| 5.2.4.4 Cells with cell reservations, access restrictions or unsuitable for normal campingFor the highest ranked cell (including serving cell) according to cell reselection criteria specified in clause 5.2.4.6, for the best cell according to absolute priority reselection criteria specified in clause 5.2.4.5, the UE shall check if the access is restricted according to the rules in clause 5.3.1.If that cell and other cells have to be excluded from the candidate list, as stated in clause 5.3.1, the UE shall not consider these as candidates for cell reselection. This limitation shall be removed when the highest ranked cell changes.If the highest ranked cell or best cell according to absolute priority reselection rules is an intra-frequency or inter-frequency cell which is not suitable due to being part of the "list of 5GS forbidden TAs for roaming", the UE shall not consider this cell and other cells on the same frequency, as candidates for reselection for a maximum of 300 seconds. If this cell belongs to a PLMN which is not indicated as being equivalent to the registered PLMN, the UE shall not consider this cell and, for operation in licensed spectrum, other cells on the same frequency as candidates for reselection for a maximum of 300 seconds. For operation with shared spectrum channel access, if the second highest ranked cell on this frequency also does not have a PLMN being equivalent to the registered PLMN, the UE may consider this frequency to be the lowest priority for a maximum of 300 seconds. If the UE enters into state *any cell selection*, any limitation shall be removed. If the UE is redirected under NR control to a frequency for which the timer is running, any limitation on that frequency shall be removed. For a UE operating in SNPN AM and in shared spectrum channel access, if the highest ranked cell or best cell according to absolute priority reselection rules is a cell which is not suitable due to not broadcasting the registered or selected SNPN ID, the UE shall not consider this cell as candidate for cell reselection but should continue to consider other cells on the same frequency for cell reselection.Editor's Note: The UE behaviour in SNPN AM in licensed bands when the highest ranked cell or best cell according to absolute priority reselection rules is a cell which is not suitable due to not broadcasting the registered or selected SNPN ID is FFS.If the highest ranked cell or best cell according to absolute priority reselection rules is an inter-RAT cell which is not suitable due to being part of the "list of forbidden TAs for roaming" or belonging to a PLMN which is not indicated as being equivalent to the registered PLMN, the UE shall not consider this cell and other cells on the same frequency, as candidates for reselection for a maximum of 300 seconds. If the UE enters into state *any cell selection*, any limitation shall be removed. If the UE is redirected under NR control to a frequency for which the timer is running, any limitation on that frequency shall be removed. |

**Question 3: Do you agree with the deletion of Editor’s note to reflect the agreement on Proposal 7.**

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| **Company** | **Yes/No** | **Comments (please provide if answering no)** |
| Huawei | Yes |  |
| ZTE | Yes |  |

**Summary:**

## 3.2 Agreement on IFRI flag

 It was agreed in the online session for 109-bis-e meeting that

* A Follow the NR-U agreement in unlicensed on the use of the IFRI flag (agreement is to be captured in TS 38.304):

- For the SNPN case, UE only follows the IFRI in MIB of a barred cell if the cell belongs to a SNPN which matches the registered SNPN of the UE. Otherwise the UE may select other cell in the same frequency

- For the CAG (PNI-NPN) case, there is no change to the existing NR-U behaviour: UE only follows the IFRI in MIB of a barred cell if the cell belongs to a registered/selected (e)PLMN. Otherwise the UE may select other cell in the same frequency.

The following text change is proposed

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| When cell status "barred" is indicated or to be treated as if the cell status is "barred",- The UE is not permitted to select/reselect this cell, not even for emergency calls.- The UE shall select another cell according to the following rule:- If the cell is to be treated as if the cell status is "barred" due to being unable to acquire the *MIB*:- the UE may exclude the barred cell as a candidate for cell selection/reselection for up to 300 seconds.- the UE may select another cell on the same frequency if the selection criteria are fulfilled.- else:- If the cell is to be treated as if the cell status is "barred" due to being unable to acquire the *SIB1* or due to *trackingAreaCode* being absent in *SIB1* as specified in TS 38.331 [3]:- The UE may exclude the barred cell as a candidate for cell selection/reselection for up to 300 seconds.- If the field *intraFreqReselection* in *MIB* message is set to "allowed", the UE may select another cell on the same frequency if re-selection criteria are fulfilled;- The UE shall exclude the barred cell as a candidate for cell selection/reselection for 300 seconds.- If the field *intraFreqReselection* in *MIB* message is set to "not allowed":- If the cell operates in licensed spectrum or if this cell belongs to a PLMN which is indicated as being equivalent to the registered PLMN or if this cell belongs to the registered SNPN of the UE:- the UE shall not re-select a cell on the same frequency as the barred cell;- else:- the UE may select to another cell on the same frequency if reselection criteria are fulfilled.- The UE shall exclude the barred cell and, if the cell operates in licensed spectrum or if this cell belongs to a PLMN which is indicated as being equivalent to the registered PLMN, also the cells on the same frequency as a candidate for cell selection/reselection for 300 seconds. |

**Question 4: Do you agree with the text change above?**

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| **Company** | **Yes/No** | **Comments (please provide if answering no)** |
| Huawei | Yes |  |
| ZTE | Yes |  |

**Summary:**

# 3 Conclusions