**3GPP TSG-RAN WG2 Meeting #113-e R2-210xxxx**

**Electronic, 25 January – 5 February 2021**

**Agenda item: 6.3.3**

**Source: Qualcomm Incorporated**

**Title: Report of [AT113-e][501][NR-U] CRs on NR-U Control Plane**

**Document for: Discussion and decision**

# Introduction

The Session Chair decided to use the following email discussion to gather feedback and put forward suggestions for the CRs and papers submitted to the Rel-16 NR-U Control Plane agenda item.

* [AT113-e][501][NR-U] CRs on NR-U Control Plane (Qualcomm)

Scope:

* + - Discuss submitted CRs in the CP AI.  Rapporteur will do preliminary assessment on criticality and need to have the CRs and companies can provide their views.

      Intended outcome:

* + - Agreeable CRs

      Deadline for providing comments:

* + - Companies comments/text suggestions and on need/criticality of the CRs– Jan. 27th
    - Rapporteur to make suggestions on which CRs should be pursued further and any possible merges – Jan. 28th
    - Updated CRs (the ones agreed to be pursued) from responsible companies Jan. 29th

This document will capture feedback from the companies and suggest whether or not to agree to the submitted CRs, possibly with some modifications.

|  |  |
| --- | --- |
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# Discussion

In this section, we discuss each document submitted to Agenda Item 6.3.3, which are as follows:

R2-2101491 Correction on description of measResultForRSSI and of conditional presence SharedSpectrum Huawei, HiSilicon 38.331 CR2415

R2-2100183 Correction on RSSI and channel occupancy measurements Samsung 38.331 CR2306

R2-2101269 Correction to search space switch configuration Ericsson 38.331 CR2396

R2-2101163 RRC Corrections for NR-U (Rel-16) ZTE Corporation, Sanechips 38.331 CR2387

R2-2101164 Corrections to UE capability for NR-U (Rel-16) ZTE Corporation, Sanechips 38.306 CR0502

R2-2100870 Discussion on NR-U RSSI/CO measurement Apple, xiaomi

R2-2100871 Clarification on NR-U RSSI measurement procedure Apple 38.331 CR2360

**R2-2101491 Correction on description of measResultForRSSI and of conditional presence SharedSpectrum Huawei, HiSilicon 38.331 CR2415**

Summary of Changes from the CR:

1. The descrption of *measResultForRSSI* is changed into“Includes RSSI result in dBm as the average of sample value(s) (see TS 38.215 [9]) and *channelOccupancy* as the rounded percentage of sample value(s) which are beyond the configured *channelOccupancyThreshold* within all the sample value(s) in the *reportInterval* for the associated *reportConfig*.”;
2. Remove “Need R” in the description of conditional presence “SharedSpectrum”.

Rapporteur opinion: The first change is of editorial type and it does not really clarify any misleading text. The second change needs feedback from RRC rapporteur for consistency in 38.331

**Do you agree with the changes proposed in this CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| **Nokia** | **Not needed** | **Not necessary as 38.215 has valid description but nothing wrong technically with the CR. So no strong objection if other companies see the need.** |
| **OPPO** | **Yes, but** | **For the first change, if the concerned ambiguity is the “measured”, it’s ok the remove this word.**  **For the second change, no issue is we don’t remove Need R.** |
| **Intel** |  | **Agree with the rapporteur’s view** |
| **Xiaomi** |  | **Agree with the rapporteur.** |
| **Samsung** | **No** | **Agree with the rapporteur’s view** |
| **ZTE** | **Not needed** | **Same view as Nokia** |
| **Apple** | **No strong view** |  |
| **LGE** |  | **Agree with the rapporteur’s view.** |
| **Ericsson** | **1) no, 2) not needed** | 1) this is **already properly captured** in the procedural text in clause 5.5.5:  2> set the *rssi-Result* to the average of sample value(s) provided by lower layers in the *reportInterval;*  2> set the *channelOccupancy* to the rounded percentage of sample values which are beyond the *channelOccupancyThreshold* within all the sample values in the *reportInterval;*  2) We checked with the RRC rapporteur, and came to the below conclusion:  In some parts, the CR lacks the corresponding ASN.1 codes concerning the conditional presence.  The cover sheet states that “Need code is used unnessarily and not following need code guideline.”  The Need code guidelines (clause A.6) only provide general rules:  The following rule provides guidance for determining need codes for optional downlink fields:  - […] if the field needs to be released by the UE when absent:  - use Need R (=Release);  The concerned fields are combined with conditional presence (clause A.3.6). So this is a specific combination with some dependencies, which makes it more complicated.  For *MeasObjectNR*: If in the unlikely case the frequency of a measurement object is changed from unlicensed to licensed, the field needs to be released. So for delta-signalling purposes, the Need R code should not be removed.  For the SIB cases: Assuming that the presence of the concerned field(s) wouldn’t change if the cells operate on the same frequency, the Need R is not really needed.  However, there is also no problem with releasing this field, even if it would not be set anyway -> no need to remove the Need R (no problem with the existing text).  **To avoid any risk that the fields might be maintained despite of absence of the field, it is OK to keep the Need R code for all cases.** |

**Summary:**

**Proposal:**

**R2-2100183 Correction on RSSI and channel occupancy measurements Samsung 38.331 CR2306**

Summary of Changes from the CR:

1. Update the procedural text in 5.5.4.1 to allow the UE to perform RSSI measurements for channel occupancy evaluation Remove “Need R” in the description of conditional presence “SharedSpectrum”.

Rapporteur opinion: The change is essential and needed.

**Do you agree with the changes proposed in this CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| **Nokia** | **Needed** | **To us this looks like required change. Coversheet is in order** |
| **OPPO** | **Yes** |  |
| **Intel** | **Agree** |  |
| **Xiaomi** | **Agree** |  |
| **Samsung** | **Yes** | **-** |
| **ZTE** | **Yes** | **We support the CR** |
| **Apple** | **Yes** |  |
| **LGE** | **Agree** |  |
| **Ericsson** | **Yes, there is an issue, but have an alternative proposal to fix this issue**  **[removed second sentence on “Need R” in summary as it is a copy and paste from the Huawei CR]** | **1) The *measRSSI-ReportConfig* is a sub-field within *EventTriggerConfig* and *PeriodicalReportConfig* respectively, and not another CHOICE of reportType. Therefore, it should be in the corresponding sub-level in the procedural text as shown below:**  **2> if the corresponding *reportConfig* includes a *reportType* set to *eventTriggered* or *periodical*:**  **3> if the corresponding *measObject* concerns NR:**  **4> if the corresponding *reportConfig* includes *measRSSI-ReportConfig*:**  **5> consider the resource indicated by the *rmtc-Config* on the associated frequency to be applicable;** |

**Summary:**

**Proposal:**

**R2-2101269 Correction to search space switch configuration Ericsson 38.331 CR2396**

Summary of Changes from the CR:

1. Add possibility to configure up to 16 cells for search space switching:

* Dummify the existing *switchTriggerToAddModList* and *switchTriggerToReleaseList* which can only configure up to 4 cells/cell groups.
* Add a new *switchTriggerToAddModList* and a new *switchTriggerToReleaseList* such that up to 16 cells can be configured.
* Add clarification in the field description that at most one cell within a cell group is configured with search space switching, which would apply to all cells in the same cell group as described in TS 38.213, clause 10.4.

1. Add missing field descriptions

Rapporteur opinion: First change is not needed. The limit “4” in *switchTriggerToAddModList-r16* is for the number of cell groups for switching where each group can have up to 16 cells as shown below. These numbers came from RAN1 list of parameters. The IE in *SlotFormatIndicator* is to configure an index in DCI for each group (needs to be done only for one cell in each group) and therefore the limit 4 in SFI is correct.

SearchSpaceSwitchConfig-r16 ::=     SEQUENCE {

    cellGroupsForSwitchList-r16         SEQUENCE(SIZE (1..4)) OF CellGroupForSwitch-r16                  OPTIONAL,   -- Need R

    searchSpaceSwitchDelay-r16          INTEGER (10..52)                                                 OPTIONAL    -- Need R

}

CellGroupForSwitch-r16 ::=          SEQUENCE(SIZE (1..16)) OF ServCellIndex

The second change is editorial and is acceptable.

**Do you agree with the changes proposed in this CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| **Nokia** | **Agree with rapportuer** | **Like indicated by rapporteur the actual configuration for cell within searchSpaceSwitchGroup is in the PDCCH config and not in the SlotFormatIndicator.**  **Though, It is good to add missing field descriptions.** |
| **OPPO** | **Agree with rapportuer** |  |
| **Intel** | **Agree with Rapporteur’s comment** |  |
| **Xiaomi** | **Agree with rapporteur** |  |
| **Samsung** | **No** | **Agree with the rapporteur’s view** |
| **ZTE** | **Agree with rapporteur** | **Indeed the restriction of 4 restricts the flexibility, but changing this now is an enhancement that is not essential.** |
| **Apple** | **Agree with rapporteur** |  |
| **LGE** | **Agree with rapporteur** |  |
| **Ericsson** | **Agree with CR**  **(proponent)** | **It is only possible to individually configure up to 4 cells or 4 cell groups. However, there is no agreement to restrict the configuration for individual cells to 4.**  **The current implementation forces the network to configure cell groups, which further requires *jointSearchSpaceGroupSwitchingAcrossCells* capability in addition to the regular *searchSpaceSetGroupSwitchingwithDCI*.**  **If the UE only has *searchSpaceSetGroupSwitchingwithDCI* capability, it is not possible to configure 16 cells.**  **The RAN1 agreement on the limit of 4 only applies to the number of cell groups, but not to the number of cells that can be configured. Hence, the RAN1 agreement has not been implemented correctly.** |

**Summary:**

**Proposal:**

**R2-2101163 RRC Corrections for NR-U (Rel-16) ZTE Corporation, Sanechips 38.331 CR2387**

Summary of Changes from the CR:

1. It is clarified in the field description that PUSCH repetition type B is not configured simultaneously with *nrofPUSCH-InSlot and cg-nrofSlots.*
2. It is clarified in the field description that, *pusch-TimeDomainAllocationListForMultiPUSCH* is configured simultaneously with pusch-AggregationFactor.

Rapporteur opinion: These are useful clarifications.

**Do you agree with the changes proposed in this CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| **Nokia** | **No strong view** | **Nothing wrong with the CR but also not very essential as existing text is not that misleading. But we are fine to agree on the CR.** |
| **OPPO** | **Yes** |  |
| **Intel** | **Agree** | **There is nothing wrong with the CR, but fine to agree the CR** |
| **Xiaomi** | **Agree** |  |
| **Samsung** | **Yes** | **We are fine with the CR to avoid misconfiguration.** |
| **ZTE** | **Yes (author)** |  |
| **Apple** | **Yes** |  |
| **LGE** | **Agree** |  |
| **Ericsson** | **OK** | **Not essential, but ok to add for clarification.** |

**Summary:**

**Proposal:**

**R2-2101164 Corrections to UE capability for NR-U (Rel-16) ZTE Corporation, Sanechips 38.306 CR0502**

Summary of Changes from the CR:

1. In the field description of *ssb-RLM-Semi-StaticChAccess-r16* SMTC is replaced by DRS window.
2. In the field description of *dci-AvailableRB-Set-r16* *availableRB-Sets-r16* is replaced with available RB sets.
3. In the field description of *searchSpaceSetGroupSwitchingwithDCI-r16* and *searchSpaceSetGroupSwitchingwithoutDCI-r16*, *jointSearchSpaceGroupSwitchingAcrossCells-r16* is replaced with *searchSpaceSetGroupSwitchingcapability2-r16*.
4. In the field description of *non-numericalPDSCH-HARQ-timing-r16,* for the IEdl-DataToUL-ACK the -r16 suffix is added.

Rapporteur opinion: The corrections all look reasonable.

**Do you agree with the changes proposed in this CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| **Nokia** | **Yes with modifications** | **Regarding “DRS window”: RAN1 specs (38.213) talks about “discovery burst transmission window”, so better use that terminology in RRC too.**  **dci-AvailableRB-Set-r16: this could refer to “available RB set indicator”, since in DCI 2\_0 we have:**  **The following information is transmitted by means of the DCI format 2\_0 with CRC scrambled by SFI-RNTI:**  **- If the higher layer parameter slotFormatCombToAddModList is configured,**  **o Slot format indicator 1, Slot format indicator 2, …, Slot format indicator N,**  **- If the higher layer parameter availableRB-SetsToAddModList-r16 is configured,**  **o Available RB set Indicator 1, Available RB set Indicator 2, …, Available RB set Indicator N1,** |
| **Intel** | **Agree** | **The main change in 3 is aligned with the R1 feature list. The other changes are ok with us.** |
| **Xiaomi** | **Agree** |  |
| **Samsung** | **Yes** | **-** |
| **ZTE** | **Yes (with Nokia’s additions)** | **We agree with both the suggested edits above from Nokia.** |
| **Apple** | **Yes** |  |
| **LGE** | **Agree** |  |
| **Ericsson** | **Yes with modifications** | 1) The summary states “DRS window”, while the actual change is “discovery burst window”, which is consistent with the RRC field name (*discoveryBurstWindowLength*). However, it would be better to align the wording in the cover sheet with the actual change.  2) OK.  3) in principle the change is correct and corresponds to RAN1 specification.  **However,** **the sentence can be removed completely** because a. The feature list (R1-2009585) does not mention the *searchSpaceSetGroupSwitchingcapability-r16* for the fields *searchSpaceSetGroupSwitchingwithDCI-r16* and *searchSpaceSetGroupSwitchingwithoutDCI-r16*  b. This is already captured in a nicer way in RAN1 spec TS 38.213, clause 10.4, and text duplication should be avoided:   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | UE processing capability 1 for SCS configuration applies unless the UE indicates support for UE processing capability 2.  Table 10.4-1: Minimum value of [symbols]   |  |  |  | | --- | --- | --- | |  | Minimum value for  UE processing capability 1 [symbols] | Minimum value for  UE processing capability 2 [symbols] | | 0 | 25 | 10 | | 1 | 25 | 12 | | 2 | 25 | 22 | |   4) OK.  **General note:** The field names are not consistent, e.g. some refer to search space set groups, some just to search space groups (without “set”)   * *searchSpaceSetGroupSwitchingwithoutDCI-r16* * *jointSearchSpaceGroupSwitchingAcrossCells-r16*   Some are also not following the RRC naming conventions (upper vs. lower case) and should be corrected, some examples:   * *searchSpaceSetGroupSwitchingcapability* * *searchSpaceSetGroupSwitchingwithDCI-r16* * *searchSpaceSetGroupSwitchingwithoutDCI-r16*   The corresponding RRC configuration uses “searchSpaceGroupSwitch”, e.g. *searchSpaceGroupIdList-r16.*  The capability names should be aligned with the names already agreed for existing fields. |

**Summary:**

**Proposal:**

**R2-2100870 Discussion on NR-U RSSI/CO measurement Apple, Xiaomi**

Proposals from the paper:

Proposal 1: RAN2 to discuss if companies have the common understanding on the discrepancy between TS 36.331 and TS 38.331 on NR-U RSSI reporting. Further discussion is needed on whether and how RAN2 would like to remove the discrepancy.

Proposal 2: Suggest to add the per band inter-RAT NR-U RSSI/CO measurement UE capability into LTE spec, as shown below.

Rapporteur opinion: For Proposal 1, agree that LAA and NR-U have different behavior but don’t see a strong reason to change NR-U at this stage in order to align with LAA.

For Proposal 2, also agree that an eNB may not be able to configure RSSI measurements for inter-RAT handover to NR-U if such eNB does not look into NR capability container (doing so is an allowed implementation). The main question is whether this is worth having an NBC CR in Rel-16 or whether it should be postponed to Rel-17.

**Do you agree to the stated discrepancy in Proposal 1? If yes, do you see a need for a solution?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| **Nokia** | **Behaviour seem to be slightly different between LAA and NR-U** | **But we do not think we need to align the behavior anymore. Although we have no strong view on the matter.** |
| **OPPO** | **No strong view** |  |
| **Intel** | **See comments** | **On Proposal 1, if I remembered correctly, the piggybacking of RSSI came about not because of LAA but from LTE DC. However, if there is difference, we do not think we need to align the behavior.** |
| **Xiaomi** | **Yes** | **For EN-DC or the inter-RAT handover from LTE to NR-U, maybe the UE behaviors can be aligned for the NR-U frequency in 36.331 and 38.331 to allow the piggybacked NR-U RSSI in the LTE measurement report.** |
| **Samsung** | **Yes but** | **We do not have to align it with LAA.** |
| **ZTE** | **Agree the behaviour is different to LAA (perhaps not intended, but not broken)** | **We have a slight preference to avoid NBC changes given the system is not broken.** |
| **Apple** | **Yes (proponent)** | **It’s better to make it aligned.** |
| **LGE** |  | **Agree with the intention but the change doesn't seem essential.** |
| **Ericsson** | **This issue has been resolved.** | **Most companies in RAN2 wanted to enable RSSI measurements also for event-triggered reporting (which diverts from LAA configuration), see below agreement from RAN2#109e:**  **10. Change the location of measRSSI-ReportConfig-r16 so that it is located in both PeriodicalReportConfig and EventTriggerConfig.**  **Therefore, we don’t see a need to align the behavior any more.** |

**Summary:**

**Proposal:**

**Do you agree to Proposal 2 for introducing NR-U RSSI reporting UE capability in LTE RRC?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| **Nokia** | **No** | **it is quite difficult to add new capabilities anymore and as stated by rapporteur this is possible to be solved within network without new capability.** |
| **Intel** | **No strong view** | **As on Proposal 2, if it can be solved with network looking into the NR capability container, there is no need for it.** |
| **Xiaomi** | **Yes** |  |
| **Samsung** | **No** | **We agree with Nokia and Intel. Also, RSSI for LAA, if supported, can be used instead.** |
| **ZTE** | **No** | **Since it is not broken, we think we should avoid NBC changes.** |
| **Apple** | **Yes (proponent)** | **We see companies have the worries this is NBC change. Then, our proposal would be to confirm the understanding that if eNB does not look into the NR UE capability container, NR-U RSSI measurement should not be configured. Otherwise, the configuration may be beyond the UE capability and leads to unspecified UE behavior.**  **Actually we would like to bring up one more similar issue on CGI-Acquisition-r16 for shared spectrum. This capability is captured in NR spec but not in LTE spec. Thus, the same proposal applies here: if eNB does not look into the NR UE capability container, CGI acquisition on NR-U should not be configured.** |
| **LGE** | **No** | **In that case, LTE RSSI measurement can be used.** |
| **Ericsson** | **Yes** | **Even though the eNB could in principle look into the NR capability container, it is not required to do so. That’s the reason why we have inter-RAT capabilities visible to each RAT. We prefer to have a clean solution here rather than work-arounds.** |

**Summary:**

**Proposal:**

**R2-2100871 Clarification on NR-U RSSI measurement procedure Apple 38.331 CR2360**

Summary of Changes from the CR:

Makes it clear that the average on RSSI samples is performed in linear domain.

Rapporteur opinion: This is an acceptable clarification.

**Do you agree with the change proposed in this CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| **Nokia** | **Yes** | **This is correct although 38.215 defines this already but OK to add this clarification** |
| **OPPO** | **Yes** |  |
| **Intel** | **Agree** |  |
| **Xiaomi** | **Yes** |  |
| **Samsung** | **No** | **It is already clear in TS 38.215 subclause 5.1.21, so it seems not essential, and no need to have additional clarification in TS 38.331.** |
| **ZTE** | **Yes, with slight modificaiton** | **It seems we use the phrase “***linear power scale average***” for such averaging in RRC elsewhere. So, perhaps we could align the terminology here too.** |
| **Apple** | **Yes (proponent)** | **To Samsung: 38.215 defines the L1 average, not L3.**  **To ZTE comment: I actually don’t know whether the “scale average” is correct or not for NR-U RSSI. Normally the term “scale” is used to define some kind of weighted average.** |
| **LGE** | **Agree** |  |
| **Ericsson** | **Yes** | **Useful clarification.** |

**Summary:**

**Proposal:**

# Conclusion

This report captures the feedback for the Control Plane contributions submitted for NR-U and, based on feedback from the companies, the following are proposed: