3GPP TSG-RAN WG2 Meeting #126 draft-R2-2405708

Fukuoka, Japan May 20th – 26th, 2024

Source: Session Chair (ZTE)

Title: Report from Further NR coverage enhancements session

**Status of At-Meeting Email Discussions**

* [AT126][800][CE\_enh] Organisational (Session chair: ZTE)

 Scope:

* Share plans and list ongoing email discussions and their status
* Share meeting notes for any comments

Status: Ongoing

**Summary of Post-Meeting Email Discussions**

* [AT126][801][CE\_enh] updated RRC CR and RIL list (Huawei)

 Scope:

* Update the RRC CR with the latest agreements and review
* Updated RIL list according the agreements from the meeting

Expected output:

* Final RRC CR for plenary
* Updated RIL list

Deadline: Short (for plenary)

* [AT126][802][CE\_enh] updated MAC CR (ZTE)

 Scope:

* Update the MAC CR with the latest agreements and review

Expected output:

* Final MAC CR for plenary

Deadline: Short (for plenary)

## 7.21 Further NR coverage enhancements

(NR\_cov\_enh2-Core; leading WG: RAN1; REL-18; WID: [RP-221858](file:///C%3A%5CData%5C3GPP%5Carchive%5CRAN%5CRAN%2396%5CTdocs%5CRP-221858.zip))

Time budget: 0 TU

Tdoc Limitation: 1 tdoc

### 7.21.1 Organizational

Incoming LSs, Rapporteur input etc.

Editorials/clarifications should not be included in any tdoc but sent to the WI spec rapporteurs, who can submit a rapporteur CR as part of this AI.

Rapporteur inputs and other pre-assigned documents in this AI do not count towards the tdoc limitation.

R2-2405056 Micellaneous MAC corrections for CE ZTE Corporation CR Rel-18 38.321 18.1.0 1851 - F NR\_cov\_enh2-Core

* Rapporteur informs that no feedback was received during the email discussion
* Use as baseline for updates from this meeting
* Will be sent to post meeting email (for plenary)
* [AT126][802][CE\_enh] updated MAC CR (ZTE)

 Scope:

* Update the MAC CR with the latest agreements and review

Expected output:

* Final MAC CR for plenary

Deadline: Short (for plenary)

[R2-2405387](file:///C%3A%5CData%5C3GPP%5CRAN2%5CDocs%5CR2-2405387.zip) Updated RIL List for CE (based on v102) Huawei, HiSilicon discussion NR\_cov\_enh2-Core

* M871, M872, E169 : Agreed
* S831: Agreed

[R2-2405388](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2405388%20RRC%20CR%20for%20agreed%20Coverage%20Enhancements%20RILs.docx) RRC CR for agreed Coverage Enhancements RILs Huawei, HiSilicon CR Rel-18 38.331 18.1.0 4833 - F NR\_cov\_enh2-Core

* Rapporteur informs that changes related S831 are not yet reflected in the running RRC.
* ZTE: for SI request there is a issue also for Rel-17 and have submitted a CR to Rel-17 with Cat A CR and there will be in issue if that is agreed.
* Use as baseline for updates from this meeting
* Will be sent to post meeting email (for plenary)
* [AT126][801][CE\_enh] updated RRC CR and RIL list (Huawei)

 Scope:

* Update the RRC CR with the latest agreements and review
* Updated RIL list according the agreements from the meeting

Expected output:

* Final RRC CR for plenary
* Updated RIL list

Deadline: Short (for plenary)

### 7.21.2 Other Essential corrections

General Discussion on which IE (rach-ConfigCommon) to use to initialize the RACH parameters for SI request/PDCCH order/CFRA with/without MSG1 repetition

[R2-2405389](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2405389%20%5BS831%5D%20Discussion%20on%20SI-RequestConfig%20for%20MSG1%20repetition.docx) [S831] Discussion on SI-RequestConfig for MSG1 repetition Huawei, HiSilicon discussion NR\_cov\_enh2-Core

Proposal 1: For non-REDCAP specific initial BWP, UE use the parameters (e.g. rach-ConfigGeneric and ssb-perRACH-Occasion) in rach-ConfigCommon associated with the same repetition number only in case that rach-OccasionsSI is absent.

Proposal 1bis: For non-REDCAP specific initial BWP, UE use the other parameters (e.g. prach-RootSequenceIndex and msg1-SubcarrierSpacing etc) in rach-ConfigCommon associated with the same repetition number only regardless of whether or not rach-OccasionsSI is absent.

Proposal 2: For REDCAP specific initial BWP, UE use the parameters (e.g. rach-ConfigGeneric and ssb-perRACH-Occasion) in rach-ConfigCommon associated with the same repetition number and (e)RedCap indication only in case that rach-OccasionsSI is absent.

Proposal 2bis: For REDCAP specific initial BWP, UE use the other parameters (e.g. prach-RootSequenceIndex and msg1-SubcarrierSpacing etc) in rach-ConfigCommon associated with the same repetition number and (e)RedCap indication only regardless of whether or not rach-OccasionsSI is absent.

Proposal 3: clarify in SI-RequestConfigRepetition description that the UE then applies the corresponding parameters depending on the RACH resource set selected for SI request with repetition upon RACH initialization and a reference is added to MAC.

* Huawei clarify that there are some parameters (e.g. prach-RootSequenceIndex and msg1-SubcarrierSpacing etc) that are used from rach-ConfigCommon and this needs some clarification.

=> Noted

[R2-2404948](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2404948%20%5BS831%5D%20Discussion%20on%20the%20remainging%20issues%20on%20Msg1%20repetition.docx) [S831] Discussion on the remainging issues on Msg1 repetition CATT discussion Rel-18 NR\_cov\_enh2-Core

Proposal 1: For SI request with MSG1 repetition on the non-REDCAP specific initial BWP, if rach-OccasionsSI is not configured, UE uses the rach-ConfigCommon associated with msg1-Repetitons feature only and with the same repetition number.

Proposal 2: For SI request with msg1 repetiton on Redcap-specific intial BWP, if rach-OccasionsSI is not configured, UE uses the rach-ConfigCommon associated with the same msg1 repetition number in initialUplinkBWP-RedCap.

Proposal 3: Introduce a new configure condition for rach-OccasionsSI in SI-RequestConfigRepetition to guarantee that only when there is available configuration of rach-ConfigCommon associated with same msg1 repetition number on initial BWP or Redcap specific intial BWP, the rach-OccasionsSI in SI-RequestConfigRepetition can be configured as optional, similiarly as 4StepCFRArep.

Proposal 4: It needed to make the clarification for (e)Redcap UEs from Rel 17 that if rach-OccasionsSI is not configured, the (e)Redcap UE uses the corresponding parameters configured in rach-ConfigCommon of the Redcap-specific initial uplink BWP.

=> Noted

[R2-2405057](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2405057%20RACH-ConfigCommon%20for%20SI%20request%20with%20Msg1%20repetition.doc) RACH-ConfigCommon for SI request with Msg1 repetition ZTE Corporation discussion Rel-18 NR\_cov\_enh2-Core

Proposal 1 For all the SI request cases (irrespective of Msg1 repetition and RedCap), if rach-OccasionsSI is not configured in corresponding SI request configuration, UE applies the RACH-ConfigCommon that is not associated with any feature. (Apply the same principle for Rel-17 and Rel-18, revert previous RAN2 agreement)

=> Noted

[R2-2405541](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2405541%20On%20RACH%20partition%20selection%20on%20RedCap-specific%20initial%20BWP_v02.docx) On RACH partition selection on RedCap-specific initial BWP for Msg1-based SI request LG Electronics Inc. discussion Rel-18 NR\_cov\_enh2-Core

Proposal 1. When a RedCap UE performs Msg1-based SI request with Msg1 repetition in RedCap-specific initial UL BWP, RACH partition associated with RedCap indication and Msg1 repetition indication with the same repetition number should be selected.

Proposal 2. When an eRedCap UE performs Msg1-based SI request with Msg1 repetition in RedCap-specific initial UL BWP, RACH partition is selected as follows:

- If the RACH partition associated with RedCap indication and Msg1 repetition indication with the same repetition number is configured, this RACH partition should be selected

- Otherwise, RACH partition associated with eRedCap indication and Msg1 repetition indication with the same repetition number should be selected.

Rel-17 proposal??

Proposal 3. When a RedCap UE performs Msg1-based SI request (without Msg1 repetition) in RedCap-specific initial UL BWP, RACH partition is selected as follows:

- If the RACH partition associated with RedCap indication is configured, this RACH partition should be selected

- Otherwise, legacy RACH partition should be selected.

Proposal 4. When an eRedCap UE performs Msg1-based SI request (without Msg1 repetition) in RedCap-specific initial UL BWP, RACH partition is selected as follows:

- If the RACH partition associated with RedCap indication is configured, this RACH partition should be selected.

- Otherwise,

 If RedCap is not applicable for eRedCap UE, RACH partition associated with eRedCap indication is selected.

 Otherwise (i.e., if RedCap is applicable for eRedCap UE), legacy RACH partition is selected.

=> Noted

**Common DISCUSSION on above papers (**[R2-2405389](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2405389%20%5BS831%5D%20Discussion%20on%20SI-RequestConfig%20for%20MSG1%20repetition.docx), [R2-2404948](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2404948%20%5BS831%5D%20Discussion%20on%20the%20remainging%20issues%20on%20Msg1%20repetition.docx), [R2-2405057](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2405057%20RACH-ConfigCommon%20for%20SI%20request%20with%20Msg1%20repetition.doc), [R2-2405541](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2405541%20On%20RACH%20partition%20selection%20on%20RedCap-specific%20initial%20BWP_v02.docx)**)**

* Samsung agree with Huawei proposals. For SI request there is no need to differentiate between RedCap and eRedCap. So, Huawei proposal is sufficient.
* Huawei think that there is an issue for separate RO case.
* LG explain that for RedCap specific BWP, RACH configuration for RedCap specific RACH partition will be selected if configured. But for eRedCap there may be some issue.
* ZTE explain that this is related to the Rel-17 discussions and explain that it is better to have unified solution. There are solutions proposed for Rel-17
* Samsung want to focus on Rel-18 and agree on Rel-18 even if it is different to Rel-17 and explain that it is okay to have a different solution since the partition for MSG1 is only introduced from Rel-18 onwards.
* Ericsson point out that there is open discussion for RedCap and we may need to revisit these agreements if they are not compatible with the agreements made there.

**For SI request with MSG1 repetition:**

Options 1: Do same as Rel-17

Option 2: Update Rel-17 and do same in Rel-18

Option 3: Do something different in Rel-18 for SI request but keep Rel-17 as it is

* If any issues are found for the agreements below for (e)RedCap, after the discussion in the common session, we can comeback.
* For non-REDCAP specific initial BWP, UE (both RedCap and non-RedCap UEs) use the parameters (e.g. rach-ConfigGeneric and ssb-perRACH-Occasion) in rach-ConfigCommon associated with the same repetition number only in case that rach-OccasionsSI is absent.
* ZTE are concerned that with the above agreement, we have different considerations for different features and is very complex. So, we should follow Rel-17 to have a common solution.
* For non-REDCAP specific initial BWP, UE (both RedCap and non-RedCap UEs) use the other parameters (e.g. prach-RootSequenceIndex, msg1-SubcarrierSpacing etc) in rach-ConfigCommon associated with the same repetition number only regardless of whether or not rach-OccasionsSI is absent.
* LG explain that with the above agreement, different time offset may be needed for different RO because the RO density may be different, but indicate that they are okay with the agreement.
* For REDCAP specific initial BWP, UE use the parameters (e.g. rach-ConfigGeneric and ssb-perRACH-Occasion) in rach-ConfigCommon associated with the same repetition number and (e)RedCap indication only in case that rach-OccasionsSI is absent.
* For the above, LG wonder if there is a need to differentiate between eRedCap + MSG1 repetition and RedCap+Msg1 repetition? But LG are okay with the above agreement
* For REDCAP specific initial BWP, UE use the other parameters (e.g. prach-RootSequenceIndex and msg1-SubcarrierSpacing etc) in rach-ConfigCommon associated with the same repetition number and (e)RedCap indication only regardless of whether or not rach-OccasionsSI is absent.

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Time offset for CFRA/SI request with Msg1 repetition

[R2-2404156](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2404156%20Correction%20on%20CFRA%20with%20Msg1%20Repetition.docx) Correction on CFRA with Msg1 Repetition vivo discussion Rel-18 NR\_cov\_enh2-Core

Proposal 1: RAN2 confirms msg1-RepetitionTimeOffsetROGroup is applicable for CFRA with Msg1 repetition.

Proposal 2: RAN2 to discuss the following options, if it is confirmed that msg1-RepetitionTimeOffsetROGroup is applicable for CFRA with a given repetition number:

- Option 1: msg1-RepetitionTimeOffsetROGroup associated with the same repetition number in FeatureCombinationPreambles is applied.

- Option 2: msg1-RepetitionTimeOffsetROGroup can be indicated together with msg1-RepetitionNum via RACH-ConfigDedicated when dedicated ROs are configured for CFRA. If absent, two neighbour RO groups are consecutive.

**DISCUSSION**

* Ericsson, Huawei, Chinatelecom, Samsung, ZTE support option 1.
* LG and ETRI think that RO density is different for CBRA and CFRA and separate configuration may be beneficial.

* For both RedCap and non-RedCap UEs, msg1-RepetitionTimeOffsetROGroup associated with the same repetition number in FeatureCombinationPreambles is applied (for both CFRA and SI request)

[R2-2405583](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2405583%20Discussion%20on%20time%20offset%20of%20RO%20group%20for%20CFRA%20with%20Msg1%20repetition.docx) Discussion on time offset of RO group for CFRA with Msg1 repetition China Telecom discussion Rel-18 NR\_cov\_enh2-Core

Proposal 1: Time offset of RO group can be applied to CFRA with Msg1 repetition. No additional spec change is needed.

=> Noted

[R2-2405068](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2405068%20Remaining%20issues%20for%20preamble%20repetitions%20-%20final.docx) Remaining issues for preamble repetitions ETRI discussion

Proposal 3: Introduce msg1-RepetitionTimeOffsetROGroup-r18 in CFRA.

Proposal 4: Introduce msg1-RepetitionNumTimeOffsetROGroup-r18 in SI-RequestConfigRepetition-r18 for each repetition number.

=> Noted

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Other issues

[R2-2404225](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2404225.zip) Correction to PHR MAC CE Design for assumed PUSCH reporting Samsung, Nokia, Nokia Shanghai Bell, Lenovo, NEC, Interdigital, Ericsson, Qualcomm, Vivo discussion Rel-18 NR\_cov\_enh2-Core

Proposal 1: For the Multiple Entry PHR with assumed PUSCH MAC CE:

* Ek indicates the presence of a PCMAX,f,c for assumed PUSCH field of Serving Cells for which Ci field is set to 1 and PCell.
* The Serving Cells for which Ci field is set to 1 and PCell are indexed sequentially starting with PCell and followed by other Serving Cells in ascending order of *ServCellIndex* i.
* The Ek field set to 1 indicates that a PCMAX,f,c for assumed PUSCH field for the kth Serving Cell is reported.

**DISCUSSION**

* Huawei, CATT still think that this solution has limited applicability. The TP changes the definition of the Ei.
* Chair wonders if there are any strong objections since there is strong support and no technical concerns? Some concerns expressed but seems this may be acceptable as there are no strong objections.
* For the Multiple Entry PHR with assumed PUSCH MAC CE:
* **Ek indicates the presence of a PCMAX,f,c for assumed PUSCH field of Serving Cells for which Ci field is set to 1 and PCell.**
* **The Serving Cells for which Ci field is set to 1 and PCell are indexed sequentially starting with PCell and followed by other Serving Cells in ascending order of *ServCellIndex* i.**
* **The Ek field set to 1 indicates that a PCMAX,f,c for assumed PUSCH field for the kth Serving Cell is reported.**

[R2-2404259](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2404259%20-%20Discussion%20on%20remaining%20issues%20for%20Coverage%20Enhancements.docx) Discussion on remaining issues for Coverage Enhancements Ericsson discussion Rel-18 38.321 NR\_cov\_enh2-Core

Proposal 1 Correct the MAC specification so that only the particular repetition factor as measured by RSRP and compared to the threshold value is considered according to TP.

DISCUSSION:

* LG, Huawei, think that the TP is incorrect as it doesn’t consider the different feature combinations.

=> Noted