**3GPP TSG-RAN WG1 Meeting #114 R1-23xxxxx**

**Toulouse, France, 21-25 August, 2023**

**Agenda Item: 9.17**

**Source: Moderator (Huawei)**

**Title: Summary of email discussion [Post114-38.212-Netw\_Energy\_NR-Core]**

**Document for: Discussion and Decision**

# Introduction

This document summarizes the discussions on the 38.212 draft CR on network energy saving for NR, and aims to stabilize the 38.212 draft CR.

[Post114-38.212-Netw\_Energy\_NR-Core] Email discussion on Rel-18 draft CRs by September 7 – Editors

# First round discussions

This section summarize the first round email discussions on [draft CR v00](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114/Inbox/drafts/9.17%28Other%29/38.212%20draft%20CRs/%5BPost114-38.212-Netw_Energy_NR-Core%5D/R1-23xxxxx%20Introduction%20of%20Rel-18%20network%20energy%20saving%20for%20NR.docx). Companies are encouraged to provide the first round views by 09/05 (Tuesday), 6:00am UTC, then we can update the draft CR accordingly for the next step discussions.

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| --- | --- |
| *Company* | *View* |
| vivo | **Comment #1:**It would be better to write clearly regarding which CSI report #n can be replaced with CSI sub-report #n, so the CR can be modified as the following,**Suggested text change in section 6.3.1.1.2**: If csi-ReportSubConfig is configured, for a corresponding CSI sub-report, the mapping order of CSI fields of one CSI CSI sub-report is determined following the procedure in this clause 6.3.1.1.2, by replacing CSI report #n in the following ~~applicable tables~~ Table 6.3.1.1.2-7, Table 6.3.1.1.2-9, Table 6.3.1.1.2-10 with CSI sub-report #n.**Suggested text change in section 6.3.2.1.2**: If *csi-ReportSubConfig* is configured, for a corresponding CSI sub-report, the mapping order of CSI fields of one CSI CSI sub-report is determined following the procedure in this clause 6.3.2.1.2, by replacing CSI report #n in the following ~~applicable tables~~ Table 6.3.2.1.2-3, Table 6.3.2.1.2-4 with CSI sub-report #n.Further discussion is needed regarding whether NCJT CSI report can be combined with multi-CSI report. For subband CSI, please see Comment #2.**Comment #2:**1. Regarding the mapping order of multiple CSI sub-reports in one CSI report, subband CSI of even subbands of all CSI sub-reports are prioritized over subband CSI of odd subbands of all CSI sub-reports within one CSI report configuration as shown in the following agreement:

**Agreement@114**For CSIs across multiple sub-configurations in one CSI reportConfig map different sub-configurations based on RAN1#114 agreement in 9.7.1* For Part 2 priority reporting level
	+ Option 1: for a given band type from {wideband, even subband, odd subband}, the omission order follows the priority order determined by sub-configuration index

But in current version of CR as shown in the following is not matched with the above agreement.Table 6.3.1.1.2-14: Mapping order of CSI reports to UCI bit sequence , with two-part CSI report(s)

|  |  |
| --- | --- |
| UCI bit sequence | CSI report number |
|  | CSI report #1, CSI part 2 wideband, as in Table 6.3.1.1.2-10/10A/10Bif CSI part 2 exists for CSI report #1 |
| CSI report #2, CSI part 2 wideband, as in Table 6.3.1.1.2-10/10A/10Bif CSI part 2 exists for CSI report #2 |
| … |
| CSI report #n, CSI part 2 wideband, as in Table 6.3.1.1.2-10/10A/10Bif CSI part 2 exists for CSI report #n |
| CSI report #1, CSI part 2 subband, as in Table 6.3.1.1.2-11/11A/11Bif CSI part 2 exists for CSI report #1 |
| CSI report #2, CSI part 2 subband, as in Table 6.3.1.1.2-11/11A/11Bif CSI part 2 exists for CSI report #2 |
| … |
| CSI report #n, CSI part 2 subband, as in Table 6.3.1.1.2-11/11A/11Bif CSI part 2 exists for CSI report #n |
| Note: For a CSI report #i containing CSI sub-reports, where i=1,2,…,n,* all the CSI part 2 widebands of CSI sub-reports are mapped to the corresponding part of UCI bit sequence of CSI report #i, from upper part to lower part in increasing order of CSI sub-report priority values;
* after the mapping of all the CSI part 2 widebands of CSI sub-reports, all the CSI part 2 subbands of CSI sub-reports are mapped to the corresponding part of UCI bit sequence of CSI report #i, from upper part to lower part in increasing order of CSI sub-report priority values.
 |

In the current spec, mapping order of odd subbands and even subbands within each CSI report should refer to a Table 6.3.1.1.2-11/11A/11B, in which the even subbands of each report are mapped before the odd subbands of one CSI report. Table 6.3.1.1.2-11: Mapping order of CSI fields of one CSI report, CSI part 2 subband, *pmi-FormatIndicator=* *subbandPMI* or *cqi-FormatIndicator=subbandCQI*

|  |  |
| --- | --- |
| CSI report #nPart 2 subband | Subband differential CQI for the second TB of all even subbands with increasing order of subband number, as in Tables 6.3.1.1.2-3/4/5, if *cqi-FormatIndicator=subbandCQI* and if reported |
| PMI subband information fields  of all even subbands with increasing order of subband number, from left to right as in Tables 6.3.1.1.2-1/2, or codebook index for 2 antenna ports according to Clause 5.2.2.2.1 in [6, TS38.214] of all even subbands with increasing order of subband number, if *pmi-FormatIndicator=* *subbandPMI* and if reported |
| Subband differential CQI for the second TB of all odd subbands with increasing order of subband number, as in Tables 6.3.1.1.2-3/4/5, if *cqi-FormatIndicator=subbandCQI* and if reported |
| PMI subband information fields  of all odd subbands with increasing order of subband number, from left to right as in Tables 6.3.1.1.2-1/2, or codebook index for 2 antenna ports according to Clause 5.2.2.2.1 in [6, TS38.214] of all odd subbands with increasing order of subband number, if *pmi-FormatIndicator=* *subbandPMI* and if reported |

Note: Subbands for given CSI report *n* indicated by the higher layer parameter *csi-ReportingBand* are numbered continuously in the increasing order with the lowest subband of *csi-ReportingBand* as subband 0.Taking CSI report#1 as an example, if CSI report#1 has 3 CSI sub-reports, and if the CR is written as it is now, the mapping order of multiple CSI sub-reports would be{even subbands of CSI sub-report#1, odd subbands of CSI sub-report#1, even subbands of CSI sub-report#2, odd subbands of CSI sub-report#2, even subbands of CSI sub-report#3, odd subbands of CSI sub-report#3}, which is clearly not consistent with the current agreement. To explicitly describe the mapping order of the CSI sub-reports, then the mapping table would need to be modified like the NCJT, e.g., by adding a new Table 6.3.1.1.2-11CTable 6.3.1.1.2-11C: Mapping order of CSI fields of one CSI report, CSI part 2 subband, *pmi-FormatIndicator=* *subbandPMI* or *cqi-FormatIndicator=subbandCQI*

|  |  |
| --- | --- |
| CSI report #nPart 2 subband | Subband differential CQI for the second TB of all even subbands with increasing order of subband number for CSI sub-report#1, as in Tables 6.3.1.1.2-3/4/5, if *cqi-FormatIndicator=subbandCQI* and if reported |
| PMI subband information fields  of all even subbands with increasing order of subband number for CSI sub-report#1, from left to right as in Tables 6.3.1.1.2-1/2, or codebook index for 2 antenna ports according to Clause 5.2.2.2.1 in [6, TS38.214] of all even subbands with increasing order of subband number, if *pmi-FormatIndicator=* *subbandPMI* and if reported |
| …… |
| Subband differential CQI for the second TB of all even subbands with increasing order of subband number for CSI sub-report#n, as in Tables 6.3.1.1.2-3/4/5, if *cqi-FormatIndicator=subbandCQI* and if reported |
| PMI subband information fields  of all even subbands with increasing order of subband number for CSI sub-report#n, from left to right as in Tables 6.3.1.1.2-1/2, or codebook index for 2 antenna ports according to Clause 5.2.2.2.1 in [6, TS38.214] of all even subbands with increasing order of subband number, if *pmi-FormatIndicator=* *subbandPMI* and if reported |
| Subband differential CQI for the second TB of all odd subbands with increasing order of subband number for CSI sub-report#1, as in Tables 6.3.1.1.2-3/4/5, if *cqi-FormatIndicator=subbandCQI* and if reported |
| PMI subband information fields  of all odd subbands with increasing order of subband number for CSI sub-report#1, from left to right as in Tables 6.3.1.1.2-1/2, or codebook index for 2 antenna ports according to Clause 5.2.2.2.1 in [6, TS38.214] of all odd subbands with increasing order of subband number, if *pmi-FormatIndicator=* *subbandPMI* and if reported |
| …… |
| Subband differential CQI for the second TB of all odd subbands with increasing order of subband number for CSI sub-report#n, as in Tables 6.3.1.1.2-3/4/5, if *cqi-FormatIndicator=subbandCQI* and if reported |
| PMI subband information fields  of all odd subbands with increasing order of subband number for CSI sub-report#n, from left to right as in Tables 6.3.1.1.2-1/2, or codebook index for 2 antenna ports according to Clause 5.2.2.2.1 in [6, TS38.214] of all odd subbands with increasing order of subband number, if *pmi-FormatIndicator=* *subbandPMI* and if reported |

Note: Subbands for given CSI report *n* indicated by the higher layer parameter *csi-ReportingBand* are numbered continuously in the increasing order with the lowest subband of *csi-ReportingBand* as subband 0.1. The same problem also exists in Table 6.3.2.1.2-7 and a new table similar to Table 6.3.1.1.2-11C should be added as well.
 |
| ZTE, Sanechips | Comment 1:There is a mixed use of“from upper part to lower part in increasing order of CSI sub-report number.” and “from upper part to lower part in increasing order of CSI sub-report priority values”. we suggest to use the latter one, i.e., “order of CSI sub-report priority values”Comment 2:A typo in highlight.“If *csi-ReportSubConfig* is configured, for a corresponding CSI sub-report, the mapping order of CSI fields of one CSI CSI sub-report is determined following the procedure in this clause 6.3.1.1.2, by replacing CSI report #n in the following applicable tables with CSI sub-report #n. ” |
| Samsung | **Comment 1#:** For DCI format 2\_9, UE is not configured with a block, instead, UE is configured with whether dynamic indication of cell DTX/DRX enabled for a serving cell by cellDTRX-DCI-config based on the agreement below. This parameter is different from the cell DTX/DRX configuration parameter. If a serving cell is configured with cell DTX/DRX, it does not mean that the activation/deactivation of the cell can be dynamically indicated in DCI format 2\_9.**Agreement*** An information block field of DCI format 2\_X is variable size either 1 or 2 bits.
	+ Higher layer signaling configures whether the activation/deactivation of cell DTX and/or cell DRX is indicated in DCI format 2\_X for a serving cell.
		- If both cell DTX and cell DRX are configured for a serving cell,
			* 1st bit corresponds to activation/deactivation of cell DTX configuration, and
			* 2nd bit corresponds to activation/deactivation of cell DRX configuration,
		- otherwise, the 1 bit corresponds to the configured cell DTX or cell DRX configuration.

**Comment 2:** the text “The number of information bits in format 2\_9 shall be equal to or less than the payload size of format 2\_9. If the number of information bits in format 2\_9 is less than the size of format 2\_9, the remaining bits are reserved.” is the restriction for gNB, it should not be captured in 38.212, we suggest to remove.We suggest the following update7.3.1.3.10 Format 2\_9DCI format 2\_9 is used for activating or de-activating the cell DTX/DRX configuration of one or multiple serving cells for one or more UEs. The following information is transmitted by means of the DCI format 2\_9 with CRC scrambled by NES-RNTI:- block number 1, block number 2,…, block number *N* where the starting position of a block is determined by the parameter *positionInDCI-cellDTRX* provided by higher layers for the UE configured with ~~the block~~ *cellDTRX-DCI-config* for a serving cell.If the UE is configured with higher layer parameter *~~nes-RNTI~~ cellDTRX-DCI-config* for a serving cell, ~~one or more blocks are configured for the UE by higher layers, with~~ the following field is defined for ~~the~~ a corresponding block:- Cell DTX/DRX indication – 2 bits if higher layer parameter *~~cellDTXconfig~~* ~~and~~ *~~cellDRXconfig~~* cellDTRX-DCI-config configures ~~are~~ both ~~configured~~ cell DTX and cell DRX for a serving cell, with the MSB corresponding to cell DTX configuration and the LSB corresponding to cell DRX configuration; otherwise 1 bit when cellDTRX-DCI-config configures either *~~cellDTXconfig~~* ~~or~~ *~~cellDRXconfig~~* ~~is configured~~ cell DTX or cell DRX for a serving cell. The size of DCI format 2\_9 is indicated by the higher layer parameter *sizeDCI-2-9*. ~~The number of information bits in format 2\_9 shall be equal to or less than the payload size of format 2\_9. If the number of information bits in format 2\_9 is less than the size of format 2\_9, the remaining bits are reserved.~~**Comment 3#:** CRI field for section 6.3.1.1.2In section 6.3.1.1.2, the following description related to CSI fields are as follows: “the bitwdith of a CSI field of the CSI sub-report is determined following the procedure in this clause 6.3.1.1.2 by taking configurations in *CSI-ReportSubConfig* when applicable”.In our view, the above description is ok for most of the CSI fields except CRI field. In the case of type 2 SD adaptation, the actual CSI-RS sources indicated by a sub-configuration is a subset of CSI-RS configured within the CSI-RS resource set. The bitwidth of CRI field should be determined based on the CSI-RS resources indicated by the corresponding sub-configuration rather than the CSI-RS resources within resource set.Hence, the following change in section 6.3.1.1.2 is suggested:“If *csi-ReportSubConfig* is configured, for a corresponding CSI sub-report, the bitwdith of a CSI field of the CSI sub-report is determined following the procedure in this clause 6.3.1.1.2 by taking configurations in CSI-ReportSubConfig when applicable. If *csi-ReportSubConfig* indicates a list of CSI-RS resource IDs, for the determination of the bitwdith of a CRI field, the value of  is the number of CSI-RS resources indicated by the list provided *csi-ReportSubConfig*.”**Comment 4#:** Table 6.3.1.1.2-12A note is added to table using the “increasing order of CSI sub-report number” for the ordering of CSI for sub-configurations. However, there is no definition of CSI sub-report number. Instead, the sub-configuration corresponding to the CSI sub-report is well defined in the agreement. Hence the following revision is suggested.Under the Table 6.3.1.1.2-12: “Note: For a CSI report #i containing CSI sub-reports, where i=1,2,…,n, all CSI sub-reports within the CSI report #i are mapped to the corresponding part of UCI bit sequence of CSI report #i, from upper part to lower part in increasing order of sub-configuration index configured for the corresponding CSI sub-report ~~number~~.”.**Comment 5#:** Table 6.3.1.1.2-13The mentioned of priority level of sub-configuration is not necessary since there is no agreement to support sub-configuration omission rule for single part CSI or part 1 CSI. Hence, it is more appropriate to use the ordering of sub-configuration index for the ordering instead of priority level of sub-configurations. Hence, the following change is suggested.Under the Table 6.3.1.1.2-13: “, and CSI sub-report #1, CSI sub-report #2, …, CSI sub-report #n in Table 6.3.1.1.2-13 correspond to the CSI sub-reports in increasing order of the corresponding configured sub-configuration index ~~CSI sub-report priority values according to clause x.x.x of [6, TS38.214].~~”.**Comment 6#:** Table 6.3.1.1.2-14We echo the comment from vivo. The current note under Table 6.3.1.1.2-14 does not reflect the agreement in RAN1#114. In RAN1#114, the following agreement was made with the understanding that the order of wideband, even subband and odd subband CSI are mapped as legacy and for each band type, CSI within one report is ordered based on sub-configuration index.Agreement (RAN1#114)For CSIs across multiple sub-configurations in one CSI reportConfig map different sub-configurations based on RAN1#114 agreement in 9.7.1* For Part 2 priority reporting level
	+ Option 1: for a given band type from {wideband, even subband, odd subband}, the omission order follows the priority order determined by sub-configuration index

The current implementation of the spec only treats {wideband, subband} in the same level but not {wideband, even subband, odd subband} in the same level. This gives the sub-configuration index higher priority than the priority of even/odd subband, which is not aligned with the above agreement.Hence, adding a new table as suggested by vivo work for us as well. Alternatively, the following revision can be considered to reflect the agreement mentioned above.

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| --- |
| Note: For a CSI report #i containing CSI sub-reports, where i=1,2,…,n,* all the CSI part 2 widebands of CSI sub-reports are mapped to the corresponding part of UCI bit sequence of CSI report #i, from upper part to lower part in increasing order of CSI sub-report priority values;
* after the mapping of all the CSI part 2 widebands of CSI sub-reports, all the even subbands of CSI part 2 subbands of CSI sub-reports are mapped to the corresponding part of UCI bit sequence of CSI report #i, from upper part to lower part in increasing order of CSI sub-report priority values.
* after the mapping of all the CSI part 2 widebands of CSI sub-reports and after the mapping of all the even subbands of CSI part 2 subbands of CSI sub-reports, all the odd subbands of CSI part 2 subbands of CSI sub-reports are mapped to the corresponding part of UCI bit sequence of CSI report #i, from upper part to lower part in increasing order of CSI sub-report priority values.
 |

**Comment 7#:** CRI field for section 6.3.2.1.2Similar comments as **Comment#3** for 6.3.1.1.2**Comment 8#:** Table 6.3.2.1.2-6Similar comments as **Comment#5** for 6.3.1.1.2**Comment 9#:** Table 6.3.2.1.2-7Similar comments as **Comment#6** for 6.3.1.1.2 |
| LG Electronics | Thank you very much for providing the draft CRs.I have a different view on **Comment#1** from Samsung.The previous RAN1 agreement captured by Samsung does not contain full texts.**Agreement*** An information block field of DCI format 2\_X is variable size either 1 or 2 bits.
	+ Higher layer signaling configures whether the activation/deactivation of cell DTX and/or cell DRX is indicated in DCI format 2\_X for a serving cell.
		- If both cell DTX and cell DRX are configured for a serving cell,
			* 1st bit corresponds to activation/deactivation of cell DTX configuration, and
			* 2nd bit corresponds to activation/deactivation of cell DRX configuration,
		- otherwise, the 1 bit corresponds to the configured cell DTX or cell DRX configuration.
	+ Note: this does not imply there may be separate higher layer signaling to enable L1 signaling based activation/deactivation for a cell DTX and/or cell DRX configuration. Signaling design is up to RAN2.

As shown in the Note, the corresponding RAN1 agreement doesn’t necessarily mean that a separate RRC signaling will be introduced. Rather, during RRC parameter discussion in RAN1, several companies already pointed out that the separate RRC signaling is not necessary. In that sense, the current CR is more aligned with the RAN1 agreement in my view. |
| Qualcomm | **Comment 1**: Typo in the following text in 6.3.1.1.2. Similar typo can be found in 6.3.2.1.2.If *csi-ReportSubConfig* is configured, for a corresponding CSI sub-report, the bitwdith of a CSI field of the CSI sub-report is determined following the procedure in this clause 6.3.1.1.2 by taking configurations in *CSI-ReportSubConfig* when applicable. **Comment 2**: share the same comments with Comment 1 from vivo for 6.3.1.1.2 – we should call out the related tables explicitly. Furthermore, only tables as pointed out by vivo are needed.Similar comments are also applied to the following text in 6.3.2.1.2If *csi-ReportSubConfig* is configured, for a corresponding CSI sub-report, the mapping order of CSI fields of one CSI CSI sub-report is determined following the procedure in this clause 6.3.2.1.2, by replacing CSI report #n in the following applicable tables with CSI sub-report #n. **Comment 3**: On Part 2 CSI sub-band, the current version of CR is aligned with our understandings. We don’t agree with suggestion on Part 2 CSI sub-band update that vivo provided in their Comment 2. The quoted agreement is for Part 2 CSI omission only. |
| Samsung2 | Regarding LG’s comment, we cannot agree. Regarding the note, in our understanding, it should be interpreted that with the agreed NEW higher layer parameter, separate higher layer signaling to enable L1 signaling may not be needed. With LG’s understanding, the agreement should be formulated as “if cell is configured with cell DTX/DRX (which is already agreed in RAN2), the activation/deactivation of cell DTX and/or cell DRX is indicated in DCI format 2\_X.” This makes the feature of activation/deactivation mandatory with a result of unnecessary restriction for gNB. In addition, separate UE capability may be required to support the dynamic indication/activation, the dynamic indication of activation/deactivation should not be based on the configuration of cell DTX/DRX operation. |
| Ericsson | **Comment #1**We think that all of the following paragraph should be in square brackets since the RRC parameter *csi-ReportSubConfig* is so far undefined. Furthermore, it is not clear what “taking configurations in *CSI-ReportSubConfig* when applicable” means.If *csi-ReportSubConfig* is configured, for a corresponding CSI sub-report, the bitwdith of a CSI field of the CSI sub-report is determined following the procedure in this clause 6.3.1.1.2 by taking configurations in *CSI-ReportSubConfig* when applicable. **Comment #2**Regarding vivo’s comment:*“Further discussion is needed regarding whether NCJT CSI report can be combined with multi-CSI report. For subband CSI, please see Comment #2.”*Our understanding is that at least for Rel-18, this combination is not supported, since we have had no discussion on NES for multi-TRP. Clearly, such a combination would need agreements on how to combine multiple CSIs for multi-TRP with multiple CSIs due to sub-configurations. We are not against such functionality; it’s just that it has not been discussed at all during the WI, so it’s hard to include this in maintenance.**Comment #3 (Section 6.3.1.1.2)**Regarding the following If *csi-ReportSubConfig* is configured, for a corresponding CSI sub-report, the mapping order of CSI fields of one CSI CSI sub-report is determined following the procedure in this clause 6.3.1.1.2, by replacing CSI report #n in the following applicable tables with CSI sub-report #n. We’d like to receive clarification: Does this restrict operation to just a single *CSI-ReportConfig*? According to legacy behavior, a trigger state can trigger more than one CSI-ReportConfig, and we don’t think this legacy behavior should be precluded.**Comment #4**We have a similar comment as vivo’s Comment #1 that “applicable tables” in the following paragraph needs clarification. Which tables are applicable? This should be spelled out.If *csi-ReportSubConfig* is configured, for a corresponding CSI sub-report, the mapping order of CSI fields of one CSI CSI sub-report is determined following the procedure in this clause 6.3.1.1.2, by replacing CSI report #n in the following applicable tables with CSI sub-report #n. **Comment #5**We echo vivo’s comment that the following agreement does not seem to be captured.**Agreement**For CSIs across multiple sub-configurations in one CSI reportConfig map different sub-configurations based on RAN1#114 agreement in 9.7.1* For Part 2 priority reporting level
	+ Option 1: for a given band type from {wideband, even subband, odd subband}, the omission order follows the priority order determined by sub-configuration index

Similar to vivo and Samsung, we also expected that new tables would need to be introduced, following a similar principle as for multi-TRP.**Comment #6**Regarding the following text:where CSI report #1, CSI report #2, …, CSI report #n in Table 6.3.1.1.2-13 correspond to the CSI reports in increasing order of CSI report priority values according to Clause 5.2.5 of [6, TS38.214], and CSI sub-report #1, CSI sub-report #2, …, CSI sub-report #n in Table 6.3.1.1.2-13 correspond to the CSI sub-reports in increasing order of CSI sub-report priority values according to clause x.x.x of [6, TS38.214]. It is not clear to us how the CSI sub-report priority values are obtained. It does seem that there is a clause in 38.214 that defines this. |
| LG Electronics2 | **@ Samsung,**Thanks for the follow-up comments.As agreed, UE can be configured with the starting position of a block for a serving cell. For instance, if a UE is associated with 4 serving cells configured with cell DTX/DRX, the UE can be configured with the starting position of a block for 2 serving cells while not configured for the other 2 serving cells. By using this higher layer signaling, gNB can enable L1 based cell DTX/DRX activation, without introducing additional/separate RRC parameter (such as cellDTRX-DCI-config in Samsung’s comment). |

# Second round discussions

TBD