**3GPP TSG RAN WG1#111 R1-22xxxxx**

**Toulouse, FR November 14 – 18, 2022**

**Agenda Item: 8.2**

**Source: Qualcomm Incorporated (Moderator)**

**Title: Preparation Phase discussion on FR2-2 Maintenance**

**Document for: Discussion, Decision**

# Introduction

The feature leads summarized the issues submitted to RAN1 #111 on FR2-2 maintenance.

# Issues for PDCCH monitoring enhancements [1]

|  |  |
| --- | --- |
| **Issue#** | **Issue** |
| PDCCH-1 | PDCCH monitoring occasion for DCI format 2\_1 |
| PDCCH-2 | Definition of configured DL-CCs number for BD/CCE budge |
| PDCCH-3 | Clarification of multi-slot monitoring in groups of slots |

Please provide your view on if you think we should which issue. Please mark a “Y” for the one you believe discussion is necessary.

|  |  |  |  |
| --- | --- | --- | --- |
| Company | PDCCH-1 | PDCCH-2 | PDCCH-3 |
| DOCOMO | Y | Y | Y |
| LG Electronics | L | Y | Y |
| Ericsson | N | Y | Y |
| Huawei, HiSilicon | N | Y | Y |
| CATT | Y | Y | Y |
| ZTE, Sanechips | N | Y | Y |
|  |  |  |  |

Additional comments

|  |  |
| --- | --- |
| Company | Comments |
| LG Electronics | PDCCH-1: Not essential. Not a correction.  PDCCH-2: Agree with FL initial assessment  PDCCH-3: Agree with FL initial assessment. By the way, since L is already used in the same section, it may be necessary to find another proper wording to avoid confusion. |
| Ericsson | PDCCH-1: Not essential, since (4,1) for 480 kHz and (8,1) for 960 kHz are default. Also, the proposed CR introduces new behavior, i.e., not a correction.  PDCCH-2: Agree with FL assessment  PDCCH-3: Agree with FL assessment (as proponent). Fine to adjust wording if needed as suggested by LGE. |
| Huawei, HiSilicon | PDCCH-1: We share the same views that it is not essential.  PDCCH-3: Agree with LGE’s comment on the use of L |
| CATT | PDCCH-1: The change is needed to align with legacy behavior. Otherwise rel-17 unintendedly changed the preamble behavior. |
| ZTE, Sanechips | PDCCH-1: We should firstly discuss whether pre-emption indication is needed for SCS 480/960 kHz before agreeing on this CR.  PDCCH-2: Agree with FL assessment  PDCCH-3: Agree with FL assessment and LGE’s comments. |

# Issues identified for scheduling and HARQ [2]

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| **Issue#** | **Issue** |
| HARQ-1 | Last DCI determination for multi-PDSCH scheduling and single PDSCH scheduling in same MO |
| HARQ-2 | Frequency hopping for PUSCH and SRS in FR2-2 |

Please provide your view on if you think we should which issue. Please mark a “Y” for the one you believe discussion is necessary.

|  |  |  |
| --- | --- | --- |
| Company | HARQ-1 | HARQ-2 |
| DOCOMO |  | Y |
| LG Electronics | Y | Y |
| Ericsson | Y | Y |
| Huawei, HiSilicon | Y | Y |
| CATT | N | Y |
| ZTE, Sanechips | Y | Y |
|  |  |  |

Additional comments

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| --- | --- |
| Company | Comments |
| DOCOMO | We hope HARQ-2 is considered just straightforward. |
| ZTE, Sanechips | For HARQ-1, it is essential because it is related to the PUCCH resource determination for HARQ-ACK when the single PDSCH scheduling DCI and multi-PDSCH scheduling DCI are transmitted in the same PDCCH monitoring occasion. If it is not resolved, the network may not know which PUCCH resource is used by the UE and therefore cannot receive the HARQ-ACK. |

# Issues identified for beam management [3]

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| --- | --- |
| **Issue#** | **Issue** |
| BM-1 | multi-PUSCH scheduling in unified TCI in FR2-2 |

Please provide your view on if you think we should which issue. Please mark a “Y” for the one you believe discussion is necessary.

|  |  |
| --- | --- |
| Company | BM-1 |
| DOCOMO | Y |
| LG Electronics | N |
| Ericsson | N |
| Huawei, HiSilicon | N |
| CATT | Y |
| ZTE, Sanechips | N |

Additional comments

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| --- | --- |
| Company | Comments |
| DOCOMO | As per the previous discussion, we view some difference between multi-PDSCH scheduling with Rel-15 spatial relation and Rel-17 unified TCI framework, which we believe should be applied to multi-PUSCH scheduling as well. Considering there is a difference from multi-PUSCH scheduling with Rel-15 spatial relation, this clarification in the CR is needed in our view. |
| LG Electronics | Current specification seems sufficient.   |  | | --- | | 5.1.5 Antenna ports quasi co-location  <Unrelated parts are omitted>  When the UE would transmit the last symbol of a PUCCH with HARQ-ACK information corresponding to the DCI carrying the TCI State indication and without DL assignment, or corresponding to the PDSCH scheduling by the DCI carrying the TCI State indication, and if the indicated TCI State is different from the previously indicated one, the indicated *DLorJointTCIState* or *UL-TCIstate* should be applied starting from the first slot that is at least symbols after the last symbol of the PUCCH. The first slot and the symbols are both determined on the carrier with the smallest SCS among the carrier(s) applying the beam indication. | |
| Ericsson | Agree with LGE that the highlighted text from Section 5.1.5 copied above applies to multi-slot PUSCH and multi-PUSCH scheduling with single DCI.  Furthermore, the wording “PUSCH transmission” in the following text in 38.214 Section 6.1 applies to multi-slot PUSCH and multi-PUSCH scheduling with single DCI.  When the UE is configured *dl-OrJoint-TCIStateList* or *UL-TCIState*, the UE shall perform PUSCH transmission corresponding to a Type 1 configured grant or a Type 2 configured grant or a dynamic grant according to the spatial relation, if applicable, with a reference to the RS for determining UL Tx spatial filter.  Hence we think the spec is already clear. |
| Huawei, HiSilicon | We share the same views as LGE and Ericsson |
| ZTE, Sanechips | We share the same view as LGE, Ericsson and HW. |

# Issues identified for channel access aspect [4]

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| **Issue#** | **Issue** |
| CA-1 | Control of SCSt based msg1/msgA transmission |
| CA-2 | Channel Access Type upgrade within gNB COT |
| CA-3 | Channel Access Type for resuming UE COT after a gap |
| CA-4 | Independent Per Beam LBT procedure in a multi-Beam COT |
| CA-5 | DCI Format 0\_2, 1\_2 |
| CA-6 | Exclude CSI-RS validation when in discovery burst |
| CA-7 | PDCCH ordered PRACH |
| CA-8 | TCI State for L3-RSSI measurement |
| CA-9 | Channel measurement and Interference Measurement subject to validation |
| CA-10 | Cg-minDFI-Delay in FR2-2 |
| CA-11 | *Channel Occupancy Duration* maximum value |
| CA-12 | Channel Access Procedure after failure of Type 2 channel access |

Please provide your view on if you think we should which issue. Please mark a “Y” for the one you believe discussion is necessary.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Company | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| DOCOMO | Y | Y | Y | N | Y | Y | Y | N | Y | N | N | N |
| LG Electronics | Y | Y | Y | N | Y | N | N | Y | Y | Y | N | N |
| Huawei, HiSilicon | Y | Y | Y | Y | N | N | Y  Please see  comments | Y | Y | Y  editorial | Y | N |
| vivo | Y | Y | Y | N | Y | N | N | Y | Y | Y, editorial | N | N |
| ZTE, Sanechips | Y | Y | Y | N | N | N | N | Y | Y | Y, editorial | N | N |
| Ericsson | Y | N | N | N | N | N | N | Y | N | N | N | N |

Additional comments

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| --- | --- |
| Company | Comments |
| DOCOMO | 1 (and 2, 3 as well) seems the highest priority (even across all sub-agendas). If nothing is achieved in this meeting, the issue should not be pursued in the future.  For 8, it should be ok to leave it to implementation/operation.  10 is ok, the reason of N is it seems editorial. |
| LG Electronics | Issues CA-1, 2, and 3 should be treated with the highest priority and it is okay as long as it is introduced whether it is supported by a unified solution or separately. For CA-7, Type 1 channel access is a baseline and, if supported, Type 2 switching via LBT upgrade seems sufficient. |
| Huawei, HiSilicon | CA-4: It was indicated by FL last meeting that further discussion is needed this meeting. In our contributions in R1-2110918 we  ***Observation 1: In Rel-16, the dependency of the ‘aligned’ start time in one channel on another independent backoff counter only happens in the multi-channel access and hence is no issue for operating on a single channel. Whereas, in Rel-17 multi-beam COT, some or all transmissions could be unnecessarily dropped even when operating on a single channel.***  Such unnecessary dropping would happen even though the channel is idle on the respective beam(s) if the time duration from the end of the previous COT to the start of the new COT is NOT at least the time required for all backoff counters to reach 0. Thus, leading to inefficient multi-beam channel access procedure.  CA-5: We think the draft CR is incorrect. The referenced tables for x\_2 formats contain only entries for FR1  CA-7: Based on our understanding of the draft CR, this issue depends on Issue CA-1 ‘Control of SCSt based msg1/msgA transmission’ i.e., on whether SCSt of Msg1/MsgA would be supported at all and whether NW control to enable/disable that SCSt would be supported or not. We believe it needs to be part of CA-1 discussion. |
| Ericsson | We think that CA-1 is the only relevant discussion that may require specification impact. We have discussed CA1 ,2 and 3 for so many meetings and think that CA2 and 3 can be deprioritized.  CA-8 can be left for implementation but ok to discuss as it does not require much effort from RAN1 side.  All others need not be discussed as it does not break the specification. |

# References

[1]. R1-221xxxx, FL Summary for B52.6 GHz PDCCH monitoring enhancements, Moderator (Lenovo)

[2]. R1-221xxxx, Summary #1 of PDSCH/PUSCH enhancements (Scheduling/HARQ), Moderator (LGE)

[3]. R1-221xxxx, FL Summary of beam management for FR2-2 maintenance, Moderator (InterDigital)

[4]. R1-221xxxx, FL summary on Maintenance of Channel Access Mechanisms for NR in 52.6 to 71GHz band, ver01, Moderator (Qualcomm)