**3GPP TSG-RAN WG1 Meeting #110bis-e, R1-22xxxxx**

**online, Oct 10 – 19, 2022**

**Agenda item: 8.2**

**Source: Qualcomm Incorporated**

**Title: Preparation phase email discussion for 8.2**

**Document for: Discussion and Decision**

# Introduction

The document summarizes the preparation phase email discussion for maintenance of Rel.17 WI on extending NR to 52.6 – 71 GHz band

# Summary of CRs submitted

## Initial access aspect

Submitted papers are summarized in [1]

The following issue is identified:

* IA-1: No CD-SSB frequency indication using NCD-SSB

Do you believe issue IA-1 should be discussed

|  |  |
| --- | --- |
| Company | View |
| Fujitsu | No.  It is not an essential issue. |
| LG Electronics | As a proponent, we think IA-1 needs to be discussed. |
| Intel | Not critical. |
| Ericsson | Yes. It seems like this change would complete the specs and be consistent with the CR agreed last meeting. |
| Huawei, HiSilicon | It is an optimization |
| vivo | Yes |
| Samsung | No.  For the part of no CD-SSB indication, legacy method is a best effort approach, and not intended to cover all the frequency range anyway, so no need for enhancement. |
| ZTE, Sanechips | We are open to discuss this issue. In our opinion, it is also feasible if no optimization is made. But if making above change, it is consistent with the approved CR in last meeting and the complexity of UE detection may be improved to some extent. |
| Qualcomm | Yes. It is consistent with the agreement from the last meeting |
| WILUS | No. it is an optimization. |

## PDCCH aspect

Submitted papers are summarized in [2]

The following issues are identified

* PDCCH-1: multi-slot PDCCH monitoring for for Group (2) SSs
* PDCCH-2: multi-slot PDCCH monitoring in CA or NR-DC scenarios
* PDCCH-3: PDCCH multi-slot monitoring restriction for DCI format 2\_1
* PDCCH-4: SSSG switching with multiple cells and different Xs

Please provide your view if these issues should be discussed

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Company | PDCCH-1 | PDCCH-2 | PDCCH-3 | PDCCH-4 |
| LG Electronics | No  FG24-4 and FG24-5 already cover those aspects. | Yes | No  Agree with Moderator’s initial assessment | Yes |
| Intel | yes | yes | yes | yes |
| Ericsson | Yes (see comment on RAN2 CR) | No (see comments on incorrect CRs) | No  Agree with Moderator’s initial assessment | Yes |
| Huawei, HiSilicon | yes | yes | No, agree with moderator’s assessment | yes |
| vivo | Yes | Yes | No  Agree with Moderator's initial assessment | Yes |
| Samsung | No  The corresponding texts should be part of UE capability. | Yes | Yes | No |
| ZTE, Sanechips | Yes | No | No  Agree with FL’s assessment | Yes |
| Qualcomm | No | Yes | No | Yes |
| WILUS | No | Yes | No  Agree with Moderator’s initial assessment | Yes |

Additional comments, if any

|  |  |
| --- | --- |
| Company | View |
| Ericsson | **PDCCH-1**  RAN2 agreed to a CR to 38.331 last meeting that says "The number of slots for multi-slot PDCCH monitoring is configured according to clause 10 in TS 38.213 [13]." Hence 331 now refers back to 38.213, and the number of slots is not described for Group (2) SSs in the current version of 38.213. LGE mentions that FG24-4 and 24-5 already cover this; however, the FG list in 38.822 is not normative. If companies prefer to capture this in 38.306 (normative spec), then we should send an LS to RAN2 to ask them to change the reference in 38.331 to 38.306 instead of 38.213. We think it is easier just to capture this in 38.213 and avoid such an LS.  **PDCCH-2**  PDCCH-2 actually has two issues.  Issue #1 (in R1-2208932)  We think the CR is incorrect, and the cases in question are already described in other paragraphs in 38.213. Hence, no CR needed.  Issue #2 (CR in R1-2208933).  This CR is incorrect. Furthermore, no CR is needed in the first place since the formula in question is correct in the current spec. The summation in the formula should be from 0 .. 6 (as in the current spec) since the formula applies to the case when there is a mixture of cells with Rel-15/16/17 monitoring. |
| ZTE, Sanechips | For PDCCH-1, we agree with Ericsson’s comment. The easier and straightforward way is to capture Group (2) SSs in TS 38.213 since the description of *monitoringSlotsWithinSlotGroup* in TS 38.331 directly refers to RAN1’s specification, also, it seems incomplete and irrational to only capture the feature for Group (1) SS sets. Hence, TS 38.213 should be updated accordingly. |

## PUCCH aspect

Submitted papers are summarized in [3]

The following issue is identified:

* PUCCH-1: RRC parameter name alignment. It is recommended to be handled in editor alignment CR for 38.213

Do you believe issue PUCCH-1 should be handled in editor alignment CR for 38.213

|  |  |
| --- | --- |
| Company | View |
| Fujitsu | Yes |
| LG Electronics | Yes |
| Intel | Yes |
| vivo | OK to be handled as alignment CR for 38.213. |
| Ericsson | Yes |
| Huawei, Hisilicon | Yes, could be in alignment CR |
| Samsung | Yes |
| ZTE, Sanechips | Yes |
| OPPO | Yes |
| Qualcomm | Yes |
| WILUS | Yes |

## RS and timeline aspect

Submitted papers are summarized in [4]

The following issues are identified:

* RS-1: Frequency resource for CSI-RS for tracking
* RS-2: UE PUSCH preparation procedure time
* RS-3: RRC parameter to disable FD-OCC

Please provide your view if these issues should be discussed

|  |  |  |  |
| --- | --- | --- | --- |
| Company | RS-1 | RS-2 | RS-3 |
| Fujitsu | Yes | Yes | Yes |
| LG Electronics | Yes | Yes | Yes |
| Intel | Yes | Yes | Yes |
| vivo | Yes | Yes | Yes |
| Ericsson | Yes | Yes | Yes |
| Huawei, HiSilicon | Yes | Yes | Yes |
| Samsung | Yes | Yes | Yes |
| ZTE, Sanechips | Yes | Yes | Yes |
| Qualcomm | Yes | Yes | Yes |
| WILUS | Yes | Yes | Yes |

Additional comments, if any

|  |  |
| --- | --- |
| Company | View |
| Fujitsu | **RS-3:**  It can be handled in editor alignment CR. |
| Intel | Agree with Fujitsu, RS-3 can be handled as part of alignment CR |
| Ericsson | Agree with Fujitsu that RS-3 can be handled in editor alignment CR |
| ZTE, Sanechips | Agree with Fujitsu, RS-3 can be handled as alignment CR |

## Scheduling and HARQ aspect

Submitted papers are summarized in [1]

The following issues are identified:

* HARQ-1-1: Type-1 HARQ CB generation
* HARQ-1-2: Type-1 HARQ CB when time bundling is configured
* HARQ-2: Maximum number of entries in TDRA table for multi-PDSCH scheduling
* HARQ-3: Indication of 32 HARQ processes in CG-DFI and CG-UCI
* HARQ-4: ZP CSI-RS rate-matching
* HARQ-5: Validity of PDSCH scheduled by multi-PDSCH scheduling DCI with mTRP operation
* HARQ-6: RRC parameter to configure multi-PXSCH scheduling
* HARQ-7: RRC parameter alignment (Editorial and can be treated in alignment CR)

Please provide your view if these issues should be discussed

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | HARQ-1-1 | HARQ-1-2 | HARQ-2 | HARQ-3 | HARQ-4 | HARQ-5 | HARQ-6 | HARQ-7 |
| Fujitsu | No | Yes | No | Yes | No | Yes | Yes | Yes |
| LG Electronics | Yes  But only for the first issue | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Intel | Yes | No | Yes | Yes | No | Yes | Yes | Yes |
| Ericsson | No |  | Yes | Yes | Yes | Yes | Yes | Yes (handle in alignment CR) |
| Huawei, Hisilicon | Yes, see comments below | Yes | Yes | Yes | Yes | yes | yes | yes |
| vivo | Yes (For the first issue) | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Samsung | No | No  (UE behavior is clear) | Yes | Yes | Yes | Yes | Yes | Yes |
| ZTE, Sanechips | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Qualcomm | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| WILUS | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Additional comments, if any

|  |  |
| --- | --- |
| Company | View |
| Fujitsu | **HARQ-1-1:**  This issue does not need to be discussed.  For proposal 1, it is not an essential issue but just an enhancement to reduce redundancy for Type-1 HARQ-ACK codebook, so it should not be discussed at current stage. The relevant agreement (in RAN1#107) on pdsch-AggregationFactor for DCI format 1\_1 and 1\_2 has already been reflected in TS 38.214.  For proposal 2, we share the same view with FL.  **HARQ-1-2:**  We believe this issue should be discussed and the specification needs to be changed. As per the discussion in RAN1#110 meeting, it is almost a common understanding that changes for “single valid PDSCH” case are needed and it should be based on Interpretation 2, so we think RAN1 does not need to repeat the discussion on whether the specification is clear or not and should focus on how to make the specification clear.  **HARQ-2:**  It can be deprioritized. Though there is a misalignment, it seems still workable.  **HARQ-4:**  It may not need to be discussed and can be deprioritized.  It seems the description in TS 38.214 as below can cover the case of multi-PDSCH scheduling. That is, all scheduled PDSCHs should apply the triggered AP CSI-RS. Even without further clarification in spec., there should be no other interpretations.  The REs indicated by sp-ZP-CSI-RS-ResourceSetsToAddModList and aperiodic-ZP-CSI-RS-ResourceSetsToAddModList are declared as not available for PDSCH when their triggering and activation are applied, respectively. |
| Huawei, HiSilicon | **HARQ-1-1** is trying to align the spec with the agreement. For the 1st issue, the CB size is impacted due to the slot aggregation factor which should not be applied on the PDSCH schedule by DC1-1 with multiple PDSCH scheduling. For 2nd issue, the current spec language “can not be provided” is not clear. Whether it is due to the some value in extendK1 set is not meet the UE processing timeline, or it is due to the collision with UL. We hope it can be clarified and have unified expression as in other places. |

## BM aspect

Submitted papers are summarized in [6]

The following issue is identified:

* BM-1: Minimum guard period between two SRS resources of an SRS resource set for antenna switching

Do you believe issue BM-1 should be discussed

|  |  |
| --- | --- |
| Company | View |
| Fujitsu | Yes, it should be discussed. |
| LG Electronics | Yes, we think BM-1 needs to be discussed. |
| Intel | ok |
| vivo | Yes |
| Ericsson | Yes BM-1 should be discussed |
| Huawei, HiSilicon | yes |
| Samsung | Yes, we agree to discuss this issue. |
| ZTE, Sanechips | Yes, this remaining issue should be solved as RAN4 has already replied RAN1’ LS |
| Qualcomm | YES |
| WILUS | Yes, it should be discussed. |

## Channel access aspect

Submitted papers are summarized in [7]

The following issues are identified:

* CA-1: UL Contention Exempt Short Control Signaling : Duty Cycle and Enable Disable
* CA-2: ChannelAccess-CPExt field Indication within RAR UL Grant and DCI formats 0\_1/1\_1
* CA-3: LBT Upgrade in COT Sharing and COT Resumption after a gap
* CA-4: Multi-Beam Channel Access : Independent per beam sensing procedure
* CA-5: TCI State for Inter-Frequency RSSI
* CA-6: Sensing Beam for PUCCH or SRS
* CA-7: CSIRS Validation when CSI-RS is contention Exempt
* CA-8: Failure of Type 2 sensing
* CA-9: ED Threshold Editorial
* CA-10: Editorial: beamCorrespondenceWithoutUL-BeamSweeping
* CA-11: Editorial: csi-RS-ValidationWithDCI, CO-DurationsPerCell-r16

Please provide your view if these issues should be discussed

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | CA-1 | CA-2 | CA-3 | CA-4 | CA-5 | CA-6 | CA-7 | CA-8 | CA-9 | CA-10 | CA-11 |
| LG Electronics | Yes | Yes | Yes | Yes | No, it will be discussed in another thread | Yes | No | No | No |  |  |
| Intel | Yes | Yes | No | Yes | As indicated by LG this will be discussed in another thread | Yes | No | No | No |  |  |
| vivo | Yes | Yes | Yes | Yes | Not in channel access | Yes | No | No | No |  |  |
| Huawei, HiSilicon | Yes | Yes | No | Yes | No, dedicated email discussion | Yes | Not needed | Not a necessary enhancement in FR2-2 | Yes |  |  |
| Samsung | Yes | Yes | Yes | Yes | No | No | Yes | No | Yes |  |  |
| ZTE, Sanechips | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | No |  |  |
| OPPO | Yes | Yes | Yes | Yes | No | Yes | No | No | No |  |  |
| Qualcomm | Yes | Yes | Yes | Yes | No | Yes | No | No | Yes |  |  |
| WILUS | Yes | Yes | Yes | Yes | No | Yes | No | Yes. It should be discussed and concluded. | No |  |  |

Additional comments, if any

|  |  |
| --- | --- |
| Company | View |
| vivo | There’re CA-10 and CA-11, we don’t think they’re necessary to discuss due to editorial nature. |
| Huawei, HiSilicon | In CA-2, please note that it is not limited to ChannelAccess-CPext field in RAR, as some contributions listed under this issue are considering the field in non-fallback DCIs 0\_1/1\_1  In CA-9, for using EDT in Type 2 LBT, current wording “to acquire a channel occupancy” restricts the use of the EDT to an initiating gNB/UE only. |
| OPPO | CA-10(Editorial*: beamCorrespondenceWithoutUL-BeamSweeping* identified by OPPO [R1-2208828]) summarized in [7] is not captured in the above table, but needs to be handled in editor alignment CR for 38.214 |

# Summary of views

For initial access aspect:

* IA-1: There is relative majority support to discuss IA-1 (6 support, 3 against)

For PDCCH aspect:

* There is strong support to discuss PDCCH-2 and PDCCH-4
* There is some support to discuss PDCCH-1 (5 support, 3 against). The against companies believe this is part of UE features
* There is minor support to discuss PDCCH-3 (2 support, 6 against). The against companies believe the spec is already clear

For PUCCH aspect:

* All support to discuss, and this can be included in editor alignment CR

For RS and timeline aspect:

* All support the discussion of RS-1, RS-2 and RS-3. RS-3 can be handled in alignment CR

For scheduling and HARQ aspect:

* There is strong support to discuss HARQ-1-2, HARQ-2, HARQ-3, HARQ-4, HARQ-5, HARQ-6, HARQ-7, where HARQ-7 can be handled in alignment CR
* There is some support to discuss HARQ-1-1 (4 support, 5 against)

For BM aspect:

* All support the discussion of BM-1

For channel access aspect:

* There is strong support to discuss CA-1, CA-2, CA-3, CA-4, CA-6
* There is no support to discuss CA-5
* There is minor support to discuss CA-7, CA-8, CA-9
* CA-10 and CA-11 are added later, but they are editorial and can be handled in alignment CR

# References

1. R1-2210347, Summary of issues on initial access aspect of NR extension up to 71 GHz, Intel
2. R1-2210409, FL Summary for B52.6 GHz PDCCH monitoring enhancements, Lenovo
3. R1-2210328, FL Summary for AI 8.2 – Enhancements for PUCCH Formats 0/1/4, Ericsson
4. R1-2210395, FL summary #1 of PDSCH/PUSCH enhancement (RS and timeline), vivo
5. R1-2210270, Summary #1 of PDSCH/PUSCH enhancements, LGE
6. R1-2210313, Discussion Summary #1 of Beam Management for new SCSs, InterDigital
7. R1-2210391, FL Summary on Maintenance of Channel Access Mechanisms for NR in 52.6 to 71GHz band, Qualcomm