**3GPP TSG RAN WG1 #109-e R1-220xxxx**

**e-Meeting, May 9th – 20th, 2022**

**Agenda item:** 8.2

**Source:** Moderator (Qualcomm)

**Title:** Moderator Summary for preparation phase on maintenance on Supporting NR from 52.6GHz to 71 GHz

**Document for:** Discussion and Decision

## Introduction

The issues in contributions submitted to RAN1#109e are summarized in the tables of sections 2 and 3. An initial assessment on each of the maintenance issues is provided based on the following classification:

* *High priority (H):* high-priority item (essential, pending issues, broken spec components) and proposed editorial changes that either enhance the clarity of the specs or correct mistakes
* *Non-essential (N)*: all other purposes such as spec optimization and low priority issues
* *Editorial (E)*: editorial issues that will be handled as editorial CRs (to be communicated to the editors/chairs)

## Issues for agenda item “8.2.1 Initial access aspects”

**Table 1 - Initial access aspects**

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| **Issue#** | **Issue** | **References** | **FL initial assessment**  | **Company inputs (if any)** |
| 1-1  | Additional RB offset for 96 PRB CORESET#0 | [1] [2] [4] [5] [6] [7] [8] [9] [10] [11] [13] | H | LGE: We prefer to defer this discussion until RAN4 finalize related issue, but open to discuss this issue. |
| 1-2 | Use of PBCH DMRS for partial indication of Q | [3] | N |  |
| 1-3 | Confirmation of WA on signaling for Q | [4] [7] [9] [11] | H | Huawei, HiSilicon: suggest to change to “N”, because the WA is already captured in the spec. it may not need to take time to confirm |
| 1-4 | CD-SSB frequency indication using NCD-SSB | [6] | H | LGE: It seems optimization but open to discuss this issue. |
| 1-5 | Description update of longBitmap of SSB-ToMeasure | [6] | E(however for RAN2 spec, therefore suggest to treat as H |  |
| 1-6 | Removal of ‘-‘ sign from 24 RB offset for mux pattern 3 | [1] | E |  |

## Issues for agenda item “8.2.2 PDCCH monitoring enhancements”

**Table 2 - PDCCH monitoring enhancements**

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| **Issue#** | **Issue** | **References** | **FL initial assessment**  | **Company inputs (if any)** |
| 2-1  | SS configuration for Type1 CSS without dedicated RRC and Type0/0A/2 CSS | [14] [15] [16] [17] [21] [22] [23] [24] [26] [28] [29] [31] [33] | H |  |
| 2-2 | default value of *monitoringSlotsWithinSlotGroup-r17* | [29] | N | LGE: It may be not a necessary issue, but it should be clarified which value will be applied when the bitmap is absent if the bitmap is defined as optional field with “Need R” condition. |
| 2-3 | PDCCH repetition for Group (1) SS sets | [33] | N |  |
| 2-4 | Applicability of $\left(X\_{s},Y\_{s}\right)$ PDCCH monitoring configuration to active or all SSSG in active BWP | [19] [21] [29] | H (related to 2-5) |  |
| 2-5 | SSSG switching between different $\left(X\_{s},Y\_{s}\right)$ PDCCH monitoring combinations | [14] [15] [17] [19] [21] [22: FLNote1] [27] [28] [29] [30] [31] [33] | H (related to 2-4) |  |
| 2-6 | SSSG switching minimum time  | [23] [27] | E (confirming WA) | Huawei, HiSilicon: the WA is already captured in the spec. No need to confirm |
| 2-7 | Support PDCCH monitoring before and after SSSG switching | [31] | N | Intel: This is same issue as 2-9, i.e., regarding potential dropping rule at the boundary of SSSG switching. We prefer to handle this issue together with issue 2-5Sharp: We share same view with Intel. Issue #2-7 and #2-9 are highly related to issue #2-5 and therefore should be discussed together. |
| 2-8 | DCI processing limitations | [14] [33] | H | Qualcomm: We support this discussion and believe that this issue is related to 2-1. |
| 2-9 | Dropping rules in case of overbooking across different slot groups | [17] [25] [33] | N | Intel: This is same issue as 2-7, i.e., regarding potential dropping rule at the boundary of SSSG switching. We prefer to handle this issue together with issue 2-5Sharp: We share same view with Intel. Issue #2-7 and #2-9 are highly related to issue #2-5 and therefore should be discussed together. |
| 2-10 | Scope of multi-slot PDCCH monitoring being mandatory capability for UE not supporting FR2-2 | [24] | H/E | DCM: As the proposing company, we generally believe this issue can be classified as E.  |
| 2-11 | BD/CCE budget determination for PDCCH monitoring (e.g. dependency on Ys) | [15] [16] [17] [21] [23] [28] [30] | H | Huawei, HiSilicon: suggest to change to non-essential (N). Five companies [15], [16], [21], [23], [28] suggest to confirm the WA. However, WA is already captured in the spec and no need to confirm. One company suggest to change the WA and provide dependency of the BD/CCE budget to Ys. However, this has been discussed extensively in the last two meetings and most companies have a different view. |
| 2-12 | UE capability signaling for CA/NR-DC operation | [14] [18] [22] [23] [30] | H |  |
| 2-13 | BD/CCE budget allocation over multiple serving cells (incl. multi-DCI multi-TRP) | [22] [30] | H | Ericsson: As proponent, we agree this needs to be completed as indicated by the spec editor after last meeting. |
| 2-14 | PDCCH monitoring pattern alignment across CCs | [30] | N | Intel: We prefer to discuss this issue for an conclusion, though we think the proposal is not necessary |
| 2-15 | Missing RRC parameter *pdcch-BlindDetectionCA-CombIndicator-r17* | [22] | E | Ericsson: The parameter needs to be added to the RRC parameter spreadsheet to send to RAN2. |
| 2-16 | COT sharing conditions | [20] | treat in 8.2.4? | Qualcomm: This can be discussed in AI 8.2.4.Huawei, HiSilicon: Seem non-essential. Maybe discussed in 8.2.4 if deemed necessary. |
| 2-17 | CSI-RS validation | [20] | treat in 8.2.4? | Qualcomm: This can be discussed in AI 8.2.4.Huawei, HiSilicon: Seem non-essential. Maybe discussed in 8.2.4 if deemed necessary. |
| 2-18 | Cancellation of downlink reception | [20] | treat in 8.2.4? | Qualcomm: This can be discussed in AI 8.2.4.Huawei, HiSilicon: Seem non-essential. Maybe discussed in 8.2.4 if deemed necessary. |
| 2-19 | PDCCH monitoring in a beam not covered by gNB sensing | [20] | treat in 8.2.4? | Qualcomm: This can be discussed in AI 8.2.4.Huawei, HiSilicon: Seem non-essential. Maybe discussed in 8.2.4 if deemed necessary. |
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FLNote1: For Issue 2-5, [22] suggests that the existing working assumption is sufficient.

## Issues for agenda item “8.2.3 PDSCH/PUSCH enhancements”

**Table 3 – RS and timeline**

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| --- | --- | --- | --- | --- |
| **Issue#** | **Issue** | **References** | **FL initial assessment**  | **Company inputs (if any)** |
| 3-1  | DMRS Bundling for same TB in FR2-2 with 120 kHz SCS across Multiple PUSCHs.FL note: the exact same issue had been discussed in RAN1#108-e where one company expressed concerns on lack of requirement study to apply this feature to FR2-2 in RAN4. FL is not aware of any change in RAN4 study status yet. | [36, 49] | N |  |
| 3-2 | Minimum applicable scheduling offset for 480/960 kHz SCS. Note: this issue is due to the newly agreed values from RAN2 on maxK0-SchedulingOffset-r17 and maxK2-SchedulingOffset-r17 for 480 kHz and 960 kHz SCS. | [50] | H | Huawei, HiSilicon: There are two proposals from [50]. The discussion should be focus on proposal #2 considering RAN2 already agreed on the proposal #1 |
| 3-3 | Antenna port field when both DMRS mapping type A and B are indicated in the TDRA row of DCI. | [43] | H |  |
| 3-4 | PTRS-DMRS association field when both DMRS mapping type A and B are indicated in the TDRA row of DCI. | [43] | H | Huawei, HiSilicon: considering the PTRS-DMRS association field only indicate the relative sequence of scheduled DMRS instead of specific antenna port index, we think it is possible to unify the field for both mapping type by implementation. Thus, 3-4 is “N” from our perspective. |

**Table 4 – Scheduling and HARQ**

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| --- | --- | --- | --- | --- |
| **Issue#** | **Issue** | **References** | **FL initial assessment**  | **Company inputs (if any)** |
| 4-1  | Clarification on type-1 HARQ CB that time domain bundling is applied across PDSCHs scheduled by “the same DCI” | [34], [41] | H | **Fujitsu:** To FL, we have one question about the discussion plan. We understand 4-1 is about at least Issue 1 in our contribution. Is it the plan to also discuss Issue 2 and Issue 3 in our contribution under 4-1 here? Or should separate items for Issue 2 and Issue 3 be added? Thanks.Intel: Agree with FL. We think should be no confusion on the limitation of ‘same DCI’, but fine for discussionFL note: To Fujitsu, from my understanding, for Issue 3 in Fujitsu’s contribution, it is tied with Issue#4-2 (OOO), and for Issue 2 in Fujitsu’s contribution, I think UE does not receive SPS PDSCH overlapped with scheduled PDSCH. But if a clarification for Issue 2 is needed, we can include this issue in Issue#4-1. |
| 4-2 | DCI-to-PDSCH OOO (case 5) and timeline of NNK1 (case 6) are based on configured SLIV vs. valid SLIV. | [34], [35], [36], [39], [41], [44], [45], [47], [48], [49], [50], [51], [52], [53] | H |  |
| 4-3 | Type-1 HARQ CB for multiple PDSCHs scheduled by single DCI 1-1 and slot-aggregated PDSCH scheduled by DCI 1-2 | [34], [38], [43], [45], [49] | H |  |
| 4-4 | Confirm working assumption that type-2 CB is generated based on “configured SLIV” | [35], [47], [49] | H | Huawei, HiSilicon: suggest to change to “N” because the TP for the WA is already captured. It may not need take time to confirm |
| 4-5 | Collision handling between PUSCH and CORESET#0 | [37], [38], [47], [52] | N | Intel: This was discussed in many meetings, but was not concluded. Suggest to conclude in this meeting. |
| 4-6 | Application of *PDSCH-AggregationFactor* /*PUSCH-AggregationFactor* for DCI format 1\_1/0\_1 “with CS-RNTI”FL note: As per previous agreement, *PDSCH-AggregationFactor*/*PUSCH-AggregationFactor* is not applied for DCI format 1\_1/0\_1 “with CS-RNTI” | [38], [41], [43], [46] | N |  |
| 4-7 | Clarification on UL DAI Indication in multi-PUSCH scheduling DCI | [38] | H | Intel: We do not think this is necessary. Current spec should be sufficient.Ericsson: Agree with Intel |
| 4-8 | TDRA information for a DCI indicating SCell dormancy without scheduling PDSCH | [39], [45], [48], [50] | H |  |
| 4-9 | Clarification on type-2 CB generation for a disabled TB when time domain bundling is configured | [39] TP1 | H | Huawei, HiSilicon: We are fine to clarify the issue but do not see the necessity of the TP1. |
| 4-10 | Clarification on type-2 CB generation when both of spatial bundling and time domain bundling are configured | [39] | H |  |
| 4-11 | Introduce an independent $n\_{HARQ-ACK}$ formula for type-2 HARQ CB when time domain is not configured but multi-PDSCH scheduling DCI is configured | [39] TP2 | N |  |
| 4-12 | Clarification on $n\_{HARQ-ACK,TB}$ when it is used for the first sub-codebook out of two sub-codebooks | [39] TP3 | E |  |
| 4-13 | Reflect the agreement that priority indicator indicated in a multi-PXSCH scheduling DCI is applied to all of scheduled PXSCHs | [40] | E |  |
| 4-14 | Clarification on HARQ ID skipping for invalidated PDSCH scheduled by multi-PDSCH scheduling DCI with ‘tdmSchemeA’ for single DCI based multi-TRP mechanism | [41] | N | **Fujitsu:** According to the specification as below, we see two possible interpretations for the case of multi-PDSCH scheduling with ‘tdmSchemeA’* Interpretation 1: If at least one of the repetitions of a PDSCH collides with semi-static UL symbols, the PDSCH (i.e., both repetitions) is not allocated with HARQ process ID.
* Interpretation 2: If the 1st repetition of a PDSCH collides with semi-static UL symbols, the PDSCH (i.e., both repetitions) is not allocated with HARQ process ID.

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| HARQ process ID is not incremented for PDSCH(s) not received if at least one of the symbols indicated by the indexed row of the used resource allocation table in the slot overlaps with a UL symbol indicated by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated* if provided. |

As the proponent, if there is a common understanding among companies, we are okey to not discuss it in the next phase. But hopefully, FL or other companies can help to clarify the correct interpretation. Thanks.FL note: My understanding is Interpretation 1. |
| 4-15 | Relationship between COT duration and PDSCHs scheduled by a single DCI | [42], [47] | N |  |
| 4-16 | Restriction on the number of PDSCH receptions/PUSCH transmissions in a slot | [43] | N | Intel: Fine to make a conclusion on the proposal |
| 4-17 | Combining HARQ-disabling feature with multi-PDSCH scheduling | [45] | N |  |
| 4-18 | Reflect the agreement that UE does not apply *pusch-AggregationFactor* to DCI format 0\_1 if multi-PUSCH scheduling DCI is configured | [46] | E |  |
| 4-19 | Clarification on UE behavior if multi-PXSCH scheduling DCI indicates BWP switching | [47] | N |  |
| 4-20 | Applicability of time domain bundling for type-3 CB | [52] | N | Intel: We prefer to clarify the behavior on Type-3 CB generation |
| 4-21 | Clarification on the applicability of K1 set extension for K1 values for DCI 1\_0 | [52] | N | Intel: As we analyze in our tdoc, the current spec is confusing on the utilization of K1 or extended K1. Suggest to discuss it |
| 4-22 | If only one PDSCH is valid among PDSCHs scheduled by a DCI, HARQ-ACK bit for that PDSCH belongs to the first sub-codebook | [53] | N |  |
| 4-23 | Clarification of PDSCH mapping type of PDSCHs scheduled by multi-PDSCH scheduling DCI with ‘tdmSchemeA’ for single DCI based multi-TRP mechanism | [53] | N |  |
| 4-X | Application of TCI states within the span of multi-PDSCH | [34] | Treated in 8.2.5? | Intel: suggest treating together with 7-2 as it is the same issue. This should be “H”Huawei, HiSilicon: fine to treat in 8.2.5 if there email thread allocated. |
| 4-Y | Channel access type indication for multiple PUSCHs in single DCI | [42] | Treated in 8.2.4? | Intel: Agree with FL. |
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## Issues for agenda item “8.2.4 Channel access mechanism”

**Table 5 - Channel access mechanism**

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| **Issue#** | **Issue** | **References** | **FL initial assessment**  | **Company inputs (if any)** |
| 5-1 | ED Threshold when LBT Bandwidth is larger than Active BWP, Upper limit on EDT Threshold | [71], [75], [56], [59], [63] | H |  |
| 5-2 | UL Contention Exempt Short Control Signaling: Duty Cycle Constraint  | [72], [73], [75], [71], [55], [56], [58], [59], [62], [64], [66] | H |  |
| 5-3 | UL Contention Exempt Short Control Signaling: Signaling for Enabling CET for msg1/msgA together | [73], [75], [71], [55], [56], [59], [60], [65], [66] | H | Huawei, HiSilicon: Suggest to change it to N. It has been previously discussed in several meetings without consensus. |
| 5-4 | Multi-Beam Channel Access: Independent per beam sensing and LBT Procedure for UE Initiated COT | [71], [75], [63], [69] | H |  |
| 5-5 | Multi-Beam Channel Access: Independent per beam sensing and LBT Procedure for UE Initiated COT: COT on a Subset of Beams | [71], [75], [56], [57], [69] | H |  |
| 5-6 | Multi-Beam Channel Access: ED Threshold for independent per beam sensing  | [71], [73], [75][54], [55], [56], [59], [69] | H |  |
| 5-7 | LBT Upgrade in COT Sharing: RRC Configuration for Channel Access Type Change for UE from Type 1 to Type 2 or Type 3 LBT | [71], [75], [56], [58], [59], [60], [63], [64], [65], [66], [70] | H | Huawei, HiSilicon: Suggest to change it to N. It has been previously discussed in several meetings without consensus. |
| 5-8 | COT resumption after a gap: RRC Configuration of Channel Access Type for resuming a UE initiated COT after a gap | [71], [75], [54], [57], [58], [60], [63], [64], [65] | H | Huawei, HiSilicon: Suggest to change it to N. It has been previously discussed in several meetings without consensus. |
| 5-9 | Channel Access Indication within Fall-Back DCI  | [55], [56], [58], [59], [63], [64], [65], [66], [70] | H | DCM: We believe this is one of the highest priority issue.  |
| 5-10 | Cyclic prefix extension for CG UL transmissions | [73], [63], [70] | N | Intel: agree with the feature lead, and we are OK to conclude it. |
| 5-11 | UL To DL COT Sharing, clarification of gNB side LBT  | [73*],* [64] | N | Intel: from our point of view the spec is still unclear on how the UL-to-DL COT sharing would be perform for CG UE, and it is not only a matter of clarifying the gNB’s side LBT but rather the UE’s behavior and the CG-UCI content. |
| 5-12 | UE Channel Access Type behavior before reporting of LBT Capability | [71], [55], [59], [70] | H |  |
| 5-13 | Clarification on UE Assumption on LBT mode at the gNB for the gNB-UE connection | [54], [59], [62] | H | Huawei, HiSilicon: Suggest to change it to N. It has been discussed for several meetings without consensus on whether the UE needs to make an assumption about the LBT mode of the gNB. |
| 5-14 | SIB 1 indication of whether LBT is required for all UL Transmissions | [54], [58], [64] | H | Huawei, HiSilicon: Suggest to change it to N. Additional indication in SIB-1 has been discussed in the previous two meetings without consensus. |
| 5-15 | Non-Fallback DCI : Extend the use of ChannelAccess-CPext-(CAPC) field to two other Non-Fallback DCI formats, namely 0\_2 and 1\_2 | [55] | N | Intel: agree with the feature lead, as this is not essential at this point. |
| 5-16 | Clarification on UE behavior when fallback DCI indicating Type 2 LBT when the UE does not have the capability | [63], [71], [55] | H | LGE: Since Proposal #9 in our contribution relates to this issue, we have added our document number to the reference.Huawei, HiSilicon: We have added our contribution ref [55] based on our Proposal 10 |
| 5-17 | Beam Selection for consecutive PUSCH transmissions when CG-PUSCH and DG-PUSCH are multiplexed | [74] | N | Intel: agree with the feature lead, as this is not essential at this point. |
| 5-18 | RAN2 Correction for Value ranges for cg-COT-Sharing-r17 and cg-COT-SharingList-r17 | [55] | E | Huawei, HiSilicon: Since such a correction is not for related to any RAN1 TS, it is not clear to us how it would be applied to RAN2 CR on 38.331 if categorized as “E”. If applying the correction requires sending an LS to RAN2 as proposed in our contribution, we believe the issue should be categorized as “H” for RAN1 to agree on sending the LS to RAN2, and also due to its RRC impact. |
| 5-19 | Clarification on TCI state for inter-frequency RSSI measurements | [55] | H |  |
| 5-20 | Alignment of RAN2 parameter ChannelAccessMode2-r17 with 37.213 | [55] | E |  |
| 5-21 | Editorial: Channel Access Procedure definition in Section 4.0 of 37.213 | [55] | E | Huawei, HiSilicon: We note that at least the proposed editorials on transmission bursts in FR2-2 would be required for the discussion on Issue#5-28 |
| 5-22 | Default Channel Access type in absence of channelAccessMode2-r17 | [56] | N |  |
| 5-23 | Beam Specific COT-SI, CO and SSGS for DCI 2\_0 | [56], [57], [59], [62], [64], [66], [68] | N | Intel: we are OK to conclude it. |
| 5-24 | RAN2 : Per Beam LBT failure indication under directional LBT | [56] | N |  |
| 5-25 | Editorial: Misalignment of higher-layer parameter name between TS 37.213 and TS 38.331. | [56] | E |  |
| 5-26 | Editorial: Misalignment of higher-layer parameter name between TS 38.212 and TS 38.331. | [56] | E |  |
| 5-27 | Editorial: Misalignment of higher-layer parameter name between TS 38.213 and TS 38.331 | [56] | E |  |
| 5-28 | Clarification on Channel access type indication for multiple PUSCHs in single DCI | [61], [64] | H |  |
| 5-29 | Clarification on Channel access Type determination when UE receives multiple channel access type indications | [61], [62], [68] | H | Huawei, HiSilicon: Suggest to focus the discussion on whether or not the dynamically indicated channel access type can be misaligned with the semi-statically indicated channelAccessMode2-r17. This is because for UE receiving multiple channelAccessMode2-r17 indications (cell-specific and UE-specific), RAN2 running CR on 38.331 in R2-2204126 already captures that the UE-specific indication overwrites the cell-specific ones. |
| 5-30 | Multi-Channel channel access clarification | [63] | N |  |
| 5-31 | Clarification on ED Threshold in COT Sharing  | [63] | N | Intel See comments on 5-11, so generally our view is that this issue should be still discussed.Huawei, HiSilicon: Suggest to change it to H. The current spec in 37.213 and 38.212 do not capture the following conclusion and agreement in RAN1 as well as the new parameters (*duration-r17, offset-r17*) introduced in RAN2 running CR on 38.331 in R2-2204126.**Conclusion**UL to DL COT sharing is supported for FR2-2 unlicensed operation, including from dynamically scheduled UL and CG-PUSCH. **Agreement**For CG-PUSCH to DL COT sharing, extend the duration and offset range to {1, …, 319}. |
| 5-32 | Rx Assistance via PDCCH and PUCCH  | [63] | N |  |
| 5-33 | Clarification/Editorial in 38.214 regarding use of beamCorrespondenceWithoutUL-BeamSweeping when used for directional sensing | [64] | E |  |
| 5-34 | LBT Downgrade from Type 2 to Type 1 on failure of Type 2 LBT | [67] | N |  |
| 5-35 | Misc. editorials of 37.213 from [73] | [73] | E | Intel: Since our proposal 12 was missing, we added it here, and would be good to capture it as editorial. |
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## Issues for agenda item “8.2.5 Others”

**Table 6 - Enhancements for PUCCH formats 0/1/4**

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| --- | --- | --- | --- | --- |
| **Issue#** | **Issue** | **References** | **FL initial assessment**  | **Company inputs (if any)** |
| 6-1  | Determination of number of RBs for PF4In [83] it is observed that 38.212 Section 6.3.1.4 contains the following sentence:,  and $N\_{PRB}^{PUCCH,4} $are the number of PRBs that are determined by the UE for PUCCH formats 2/3/4 transmission respectively according to Clause 9.2 of [5, TS38.213]In [83], it is claimed that "there is no description in Clause 9.2 of TS 38.213 [2] to determine the actual number of PRBs used for enhanced PUCCH format 4"To the contrary, the FL observes that 38.213 Clause 9.2.1 does indeed specify the number of PRBs for enhanced PUCCH format 4 according to the following paragraph: If the *format* indicates *PUCCH-format4*, the PUCCH format configured for a PUCCH resource is PUCCH format 4, where the PUCCH resource also includes a number of symbols for a PUCCH transmission provided by *nrofSymbols*, an orthogonal cover code length by *occ-Length*, an orthogonal cover code index by *occ-Index*, and a first symbol for the PUCCH transmission provided by *startingSymbolIndex*. For PUCCH transmission in FR2-2, the PUCCH resource can also include a number of PRBs $M\_{RB}^{PUCCH,4}$ provided by *nrofPRBs*; otherwise, $M\_{RB}^{PUCCH,4}=1$*.*Hence, the FL's assessment is that it is not necessary to discuss this issue. | [83] | N | Huawei, HiSilicon: As the proponent company, we think the clarification provided in our TP is required. Please note a similar text to the second (lower) yellow text from 9.2.1 of 38.213 for PUCCH Fromat 4 that is mentioned by our FL is also provided for PUCCH Format 2 and 3 in clause 9.2.1 of 38.213: “If the *format* indicates *PUCCH-format2* or *PUCCH-format3*,the PUCCH format configured for a PUCCH resource is PUCCH format 2 or PUCCH format 3, respectively, where the PUCCH resource also includes a number of PRBs provided by *nrofPRBs*,” This, however, does not mean that the actual PRBs for PUCCH transmission when PUCCH Format 2 or 3 is used is determined by *nrofPRBs.* See, for instance, the following text from clause 9.2.3:“If a UE transmits a PUCCH with $O\_{ACK}$ HARQ-ACK information bits and $O\_{CRC}$ bits using PUCCH format 2 or PUCCH format 3 in a PUCCH resource that includes $M\_{RB}^{PUCCH}$ PRBs, the UE determines a number of PRBs $M\_{RB,min}^{PUCCH}$ for the PUCCH transmission to be the minimum number of PRBs, that is smaller than or equal to a number of PRBs $M\_{RB}^{PUCCH}$ provided respectively by *nrofPRBs* of *PUCCH-format2* or *nrofPRBs* of *PUCCH-format3* and start from the first PRB from the number of PRBs, that results to $\left(O\_{ACK}+O\_{CRC}\right)\leq M\_{RB,min}^{PUCCH}⋅N\_{sc,ctrl}^{RB}⋅N\_{symb-UCI}^{PUCCH}⋅Q\_{m}⋅r$ and, if $M\_{RB}^{PUCCH}>1$, $\left(O\_{ACK}+O\_{CRC}\right)>\left(M\_{RB,min}^{PUCCH}-1\right)⋅N\_{sc,ctrl}^{RB}⋅N\_{symb-UCI}^{PUCCH}⋅Q\_{m}⋅r$, where $N\_{sc,ctrl}^{RB}$, $N\_{symb-UCI}^{PUCCH}$, $Q\_{m}$, and $r$ are defined in clause 9.2.5.2. For PUCCH format 3, if $M\_{RB,min}^{PUCCH}$ is not equal $2^{α\_{2}}⋅3^{α\_{3}}⋅5^{α\_{5}}$ according to [4, TS 38.211], $M\_{RB,min}^{PUCCH}$ is increased to the nearest allowed value of *nrofPRBs* [12, TS 38.331]. If $\left(O\_{ACK}+O\_{CRC}\right)>\left(M\_{RB}^{PUCCH}-1\right)⋅N\_{sc,ctrl}^{RB}⋅N\_{symb-UCI}^{PUCCH}⋅Q\_{m}⋅r$, the UE transmits the PUCCH over $M\_{RB}^{PUCCH}$ PRBs.”A similar clarification is not provided for PUCCH Format 4 in the specifications. Our TP clarifies that, unlike PUCCH format 2 and 3, the actual number of PRBs used for PUCCH Format 4 is the same as the number of Configured PRBs. In addition, according to TS38.212, the number of PRBs is determined by the UE for PUCCH format 4 according to Clause 9.2 of [5, TS38.213], which is UE’s behavior. However, the paragraph mentioned by our FL just describe the configuration for PUCCH format 4, which is gNB’s behavior. The UE behavior should be clarified in TS38.213 for PUCCH format 4 that the actual number of PRBs determined by the UE is equal to the configured number of PRBs. |
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**Table 7 - Beam management for new SCSs**

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| --- | --- | --- | --- | --- |
| **Issue#** | **Issue** | **References** | **FL initial assessment**  | **Company inputs (if any)** |
| 7-1  | Introduction of beam switching gap | [76], [80], [82], [83] | H | Huawei, HiSilicon: Added [83] to the references column. Suggest to wait for final decision of RAN4 regarding beam switching time. [76], [80], [82] propose to define UE capability for beam switch time. This has been discussed for multiple meetings already without agreement. We don’t think RAN1 should define a UE capability and decide on beam switching time values while RAN4 has a parallel discussion on UE beam switching time. If this has to be discussed in RAN1, RAN1 should make decision on the tentatively-agreed value of [200ns] in RAN4 which requires 1 symbol gap for both 480 and 960 kHz SCS (no need for UE capability). |
| 7-2 | Whether to update the applied TCI states within the span of multi-PDSCH | [76], [77], [78], [79], [80], [82], [34] | H | Qualcomm: We believe this is not essential. The current spec is clear alreadyEricsson: Agree with Qualcomm that no spec change is needed. Current spec already allows update within time span (see observations in our Tdoc)Huawei, HiSilicon: added [34] to the reference column. We submitted it to AI8.2.3. |
| 7-3 | Minimum guard period Y between two SRS resources of an SRS resource set for antenna switching | [77] | N (essential but RAN4 should discuss the issue based on the RAN1 LS)  | Qualcomm: Prefer to wait for RAN4 responseEricsson: Agree with Qualcomm; RAN1 cannot make progress until there is feedback from RAN4. |
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**Table 8 – Other issues**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Issue** | **References** | **FL initial assessment**  | **Company inputs (if any)** |
| 8-1  | [description of the issue] |  |  | [Companies will fill input their views here] |
|  |  |  |  |  |
|  |

## Conclusion

Based on the responses from participating companies during the preparation phase, the final FL recommendation is:

# References

Contributions submitted to 8.2.1

[1]. R1-2203079, Remaining issue of initial access signals and channels for 52-71GHz spectrum, Huawei, HiSilicon, SIA

[2]. R1-2203290, Remaining issues on initial access aspects for 52.6 to 71GHz, ZTE, Sanechips

[3]. R1-2203369, Remaining issues for initial access operation in 52.6-71GHz, InterDigital, Inc.

[4]. R1-2203430, Remaining issues on Initial access aspects for up to 71GHz operation, CATT

[5]. R1-2203508, Maintenance on initial access for NR operation from 52.6GHz to 71GHz, vivo

[6]. R1-2203858, Maintenance on initial access aspects for NR from 52.6 GHz to 71 GHz, Samsung

[7]. R1-2203986, Discussion on remaining issue for initial access aspects, OPPO

[8]. R1-2204110, Initial Access Aspects, Ericsson

[9]. R1-2204201, Remaining issues for initial access aspects, Apple

[10]. R1-2204338, Remaining issues on initial access aspects for NR in FR2-2, NTT DOCOMO, INC.

[11]. R1-2204599, Initial access aspects, Nokia, Nokia Shanghai Bell

[12]. R1-2204611, Remaining issues of initial access aspects to support NR above 52.6 GHz, LG Electronics

[13]. R1-2204766, Discussion on initial access aspects for extending NR up to 71 GHz, Intel Corporation

Contributions submitted to 8.2.2

[14]. R1-2203080, Remaining issues of PDCCH monitoring enhancement for 52-71GHz spectrum, Huawei, HiSilicon, SIA

[15]. R1-2203291, Remaining issues on PDCCH monitoring enhancements for 52.6 to 71GHz, ZTE, Sanechips

[16]. R1-2203370, Remaining issues for PDCCH monitoring enhancements, InterDigital, Inc.

[17]. R1-2203431, Remaining issues on PDCCH monitoring enhancements for up to 71GHz operation, CATT

[18]. R1-2203509, Maintenance on PDCCH monitoring enhancements for NR operation from 52.6GHz to 71GHz, vivo

[19]. R1-2203859, Maintenance on PDCCH monitoring enhancements for NR from 52.6 GHz to 71 GHz, Samsung

[20]. R1-2203987, Discussion on remaining issue for PDCCH monitoring enhancement, OPPO

[21]. R1-2204075, Remaining issues on PDCCH monitoring , Panasonic

[22]. R1-2204111, PDCCH Monitoring Enhancements, Ericsson

[23]. R1-2204202, On remaining issues for PDCCH Monitoring, Apple

[24]. R1-2204339, Remaining issues on PDCCH monitoring enhancements for NR in FR2-2, NTT DOCOMO, INC.

[25]. R1-2204514, PDCCH monitoring enhancements, Sharp

[26]. R1-2204566, Remaining Issues on PDCCH Monitoring Enhancements in FR2-2, TCL Communication

[27]. R1-2204578, Remaining issues of PDCCH monitoring enhancements for above 52.6GHz, Transsion Holdings

[28]. R1-2204600, Remaining issues on PDCCH monitoring enhancements, Nokia, Nokia Shanghai Bell

[29]. R1-2204612, Remaining issues of PDCCH monitoring enhancements to support NR above 52.6 GHz, LG Electronics

[30]. R1-2204706, Remaining discussion on PDCCH monitoring enhancement for 52.6-71 GHz NR operation, MediaTek Inc.

[31]. R1-2204767, Discussion on PDCCH monitoring enhancements for extending NR up to 71 GHz, Intel Corporation

[32]. R1-2204825, Remaining issues on PDCCH for NR from 52.6 GHz to 71GHz, Lenovo

[33]. R1-2204979, PDCCH monitoring enhancements for NR in 52p6 to 71GHz band, Qualcomm Incorporated

Contributions submitted to 8.2.3

[34]. R1-2203081, Remaining issues of PDSCH/PUSCH enhancement for 52-71GHz spectrum, Huawei, HiSilicon, SIA

[35]. R1-2203292, Remaining issues on data channel enhancements for 52.6 to 71GHz, ZTE, Sanechips

[36]. R1-2203371, Remaining issues for PDSCH/PUSCH enhancements to supporting 52.6-71 GHz band in NR, InterDigital, Inc.

[37]. R1-2203401, Discussion on PDSCH/PUSCH enhancements for NR 52.6-71 GHz, Panasonic

[38]. R1-2203432, Remaining issues on PDSCH/PUSCH enhancements for up to 71GHz operation, CATT

[39]. R1-2203510, Maintenance on PDSCH/PUSCH enhancements for NR operation from 52.6GHz to 71GHz, vivo

[40]. R1-2203678, Remaining issues of PDSCH/PUSCH enhancements for 52.6 to 71GHz, NEC

[41]. R1-2203708, Remaining issues of multi-PDSCH/PUSCH scheduling via a single DCI, Fujitsu Limited

[42]. R1-2203784, Remaining issues on PDSCH and PUSCH enhancements for NR 52.6-71GHz, xiaomi

[43]. R1-2203860, Maintenance on PDSCH/PUSCH enhancements for NR from 52.6 GHz to 71 GHz, Samsung

[44]. R1-2203988, Discussion on remaining issue for PDSCH/PUSCH enhancements, OPPO

[45]. R1-2204112, PDSCH-PUSCH Enhancements, Ericsson

[46]. R1-2204190, Discussion on multi-PXSCH scheduling, ASUSTeK

[47]. R1-2204203, On remaining issues for PDSCH PUSCH Enhancements, Apple

[48]. R1-2204340, Remaining issues on PDSCH/PUSCH enhancements for NR in FR2-2, NTT DOCOMO, INC.

[49]. R1-2204601, Remaining issues on PDSCH/PUSCH enhancements, Nokia, Nokia Shanghai Bell

[50]. R1-2204613, Remaining issues of PDSCH/PUSCH enhancements to support NR above 52.6 GHz, LG Electronics

[51]. R1-2204707, Remaining discussion on multi-PDSCH scheduling design for 52.6-71 GHz NR operation, MediaTek Inc.

[52]. R1-2204768, Discussion on PDSCH/PUSCH enhancements for extending NR up to 71 GHz, Intel Corporation

[53]. R1-2204980, PDSCH and PUSCH enhancements, Qualcomm Incorporated

Contributions submitted to 8.2.4

[54]. R1-2203056, Remaining Details in Channel access for Beyond 52.6 GHz, FUTUREWEI

[55]. R1-2203082, Remaining issues of channel access mechanism for 60 GHz unlicensed operation, Huawei, HiSilicon, SIA

[56]. R1-2203293, Remaining issues on channel access for 52.6 to 71GHz, ZTE, Sanechips

[57]. R1-2203372, Remaining issues for channel access mechanisms, InterDigital, Inc.

[58]. R1-2203433, Remaining issues on channel access mechanism for up to 71GHz operation, CATT

[59]. R1-2203511, Maintenance on channel access mechanism for NR operation from 52.6GHz to 71 GHz, vivo

[60]. R1-2203679, Remaining issues on channel access mechanism supporting NR from 52.6 to 71 GHz, NEC

[61]. R1-2203785, Remaining issues on channel access mechanism for NR on 52.6-71 GHz, xiaomi

[62]. R1-2203861, Maintenance on channel access mechanism for NR from 52.6 GHz to 71 GHz, Samsung

[63]. R1-2203989, Discussion on remaining issue for channel access mechanism, OPPO

[64]. R1-2204113, Channel Access Mechanisms, Ericsson

[65]. R1-2204204, Remaining details on channel access mechanisms for unlicensed access above, Apple

[66]. R1-2204341, Remaining issues on Channel access mechanism for NR in FR2-2, NTT DOCOMO, INC.

[67]. R1-2204546, Remaining issue on channel access for NR from 52.6GHz to 71GHz, WILUS Inc.

[68]. R1-2204567, Remaining Issues on Channel Access for NR in 60GHz Unlicensed Band, TCL Communication

[69]. R1-2204579, Remaining issues of channel access mechanism for above 52.6GHz, Transsion Holdings

[70]. R1-2204602, Remaining issues on channel access mechanism, Nokia, Nokia Shanghai Bell

[71]. R1-2204614, Remaining issues of channel access mechanism to support NR above 52.6 GHz, LG Electronics

[72]. R1-2204636, Remaining issue on channel access scheme for above 52.6GHz, ASUSTeK

[73]. R1-2204769, Discussion on Channel Access Mechanism for extending NR up to 71 GHz, Intel Corporation

[74]. R1-2204826, Remaining issues on channel access for NR from 52.6 GHz to 71GHz, Lenovo

[75]. R1-2204981, Channel access enhancements, Qualcomm Incorporated

Contributions submitted to 8.2.5

[76]. R1-2203294, Remaining issues on beam management for 52.6 to 71GHz, ZTE, Sanechips

[77]. R1-2203373, Remaining issues for beam management for new SCSs, InterDigital, Inc.

[78]. R1-2203512, Maintenance on beam management, vivo

[79]. R1-2204114, Remaining issues for beam management, Ericsson

[80]. R1-2204342, Remaining issues on beam based operation for new SCSs for NR from 52.6 to 71 GHz, NTT DOCOMO, INC.

[81]. R1-2204603, Supported values for SSSG switching delay for 480 kHz and 960 kHz SCS, Nokia, Nokia Shanghai Bell

[82]. R1-2204615, Remaining issues of beam management to support NR above 52.6 GHz, LG Electronics

[83]. R1-2204896, Remaining issues of PUCCH enhancement and beam management enhancement for 52-71GHz spectrum, Huawei, HiSilicon, SIA