**3GPP TSG-RAN WG1 #110bis-e R1-221xxxx**

**e-Meeting, October 10 – 19, 2022**

**Agenda Item: 8.12**

**Source: Moderator (CMCC)**

**Title: Moderator’s summary on scheduling related issues for Rel-17 NR MBS**

**Document for: Discussion and Decision**

# Introduction

[110bis-e-R17-MBS-03] Email discussion for maintenance on mechanisms to support broadcast/multicast for RRC\_CONNECTED/RRC\_IDLE/RRC\_INACTIVE UEs for the following issues in R1-2210371 – Tuo (CMCC)

* Issues 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, 2-7 (including whether this is simply a spec alignment issue), 2-8, 2-9
* Editorial/alignment issues for providing to spec editors: 2-11, 2-12, 2-13, 2-14, 2-15
* Discuss for clarification of the issue (potentially discuss CR at RAN1#111, or conclude at RAN1#110bis-e that the issue is not essential): 2-10, 2-16, 2-17
* Discuss whether LS reply to R1-2208581 is needed for issue 2-18
* Check points: October 14, October 19

This summary provides discussions for the scheduling related issues for Rel-17 NR MBS.

# Issues for discussion

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| **Issue#** | **Issue** | **References** | **Final assessment** |
| 2-1 | CR on the MBS reception type combinations in TS 38.202/38.213/38.214  *FL Note: correct the PDSCH reception restriction/type combinations as well as specs alignment between TS 38.202/38.213/38.214* | CMCC[R1-2209311]  ZTE[R1-2209473]  MediaTek[R1-2209524]  Huawei[R1-2210208][R1-2210209][R1-2210210] | H |
| 2-2 | CR on the maximum data rate for multiplexing MBS and unicast  *FL Note: Continue discussion of the clarification of the max data rate/LBRM for unicast and MBS multiplexing* | Huawei[R1-2209833]  Qualcomm[R1-2209956][R1-2209957][R1-2209958] | H |
| 2-3 | CR on PDCCH monitoring behavior when overlaps with rate matching pattern  *FL Note: initial discussion in last RAN1 meeting, further discussion is needed in this meeting* | Huawei[R1-2208469]  MediaTek[R1-2209525]  Qualcomm[R1-2209961] | H |
| 2-4 | TP on FDRA determination of multicast DCI formats  *FL Note: correct the FDRA bitlength formula, easily to be agreeable* | Nokia[R1-2208701] | H |
| 2-5 | CR on SS0 availability for scheduling MBS  *FL Note: align the UE behavior of using SS0 for MBS between TS 38.331 and TS 38.213* | Huawei[R1-2208470] | H |
| 2-6 | CR on multicast rate-matching pattern configuration number  *FL Note: align the configured multicast rate-matching pattern number between TS 38.331 and TS 38.214* | CMCC[R1-2209313] | H |
| 2-7 | CR on CFR configuration and simultaneous configuration of multicast PDSCH on two serving cells  *FL Note: correct the CFR bandwidth and location configuration* | ZTE[R1-2209471]  CATT[TP#2 in R1-2208927] | H |
| 2-8 | CR on collision handling between SPS and DG for MBS  *FL Note: define the UE behavior of PDSCH collision between unicast DG and multicast SPS or MBS DG and unicast SPS* | CMCC[R1-2209314] | H |
| 2-9 | CR on multicast SPS activation validation when UE is only configured one multicast SPS  *FL Note: To address the issue that SPS index=0 cannot be configured to some UE which only supports one multicast SPS* | ASUSTeK[R1-2210075] | H |
| 2-10 | CR on definition of G-CS-RNTI for SPS group-common PDSCH retransmission  *FL Note: FL views this CR is not pursued, the following sentence in TS 38.213 has declared that G-CS-RNTI can be used for SPS GC-PDSCH retransmission.*  *“For the first HARQ-ACK reporting mode and for a transport block that a UE received in a SPS PDSCH, a PDSCH reception providing a retransmission of the transport block can be scheduled either by a unicast DCI format using a CS-RNTI or by a multicast DCI format using a same G-CS-RNTI as the G-CS-RNTI of the initial transmission of the transport block [6, TS 38.214].”* | CATT[TP#1 in R1-2208927] | Discuss at RAN1#110bis-e only to clarify the issue and whether it is essential (to control the workload) |
| 2-11 | Alignment CR on RRC parameters correction in TS 38.211 | CMCC[R1-2209315] | E |
| 2-12 | Alignment CR on RRC parameters correction in TS 38.213 | CMCC[R1-2209316]  ASUSTeK[R1-2210095] | E |
| 2-13 | Alignment CR on RRC parameters correction in TS 38.213 | CMCC[R1-2209317] | E |
| 2-14 | Alignment CR on RRC parameters correction in TS 38.214 | CMCC[R1-2209318]  ASUSTeK[R1-2210096] | E |
| 2-15 | CR on terms of G-RNTI used for MTCH  *FL Note: ok to align the usage of the terms across the entire spec* | ZTE[R1-2209472] | E |
| 2-16 | per G-RNTI timeDurationForQCL configuration | LGE[R1-2209449] | Discuss at RAN1#110bis-e only to clarify the issue and whether it is essential (to control the workload) |
| 2-17 | CR on FDM SPS collision handling  *FL Note: half of companies commented it as non-essential issue in last RAN1 meeting* | vivo[R1-2208620]  ZTE[R1-2209474  Ericsson [R1-2210173] | Discuss at RAN1#110bis-e only to clarify the issue and whether it is essential (to control the workload) |
| 2-18 | MBS SPS configuration on SCell  *FL Note: The LS was guided to be discussed in UE feature session but was not touched due to limited time in the last meeting. FL assesses LS reply is not necessarily needed even though the issue has not been reached in UE feature discussion session.* | vivo-Draf LSR-x08581 | Discuss at RAN1#110bis-e only to clarify whether LS reply is needed though the issue will not be finalized in UE feature session in time (to control the workload) |

# Discussions for the issues

## Issue#2-1: MBS reception type combinations

**CR to TS 38.202:**

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| MediaTek[R1-2209524] | |  |  |  |  | | --- | --- | --- | --- | | 3. RRC\_CONNECTED | | | | | (A + ((C0 + (B and/or (D0 or (m1\*D1+m2\*D2+((m3\*D3+m4\*D4) or m5\*(D5 or D6))))) + E + F0 + n\*F1 + G + H + J0 + J1 + J2 + K + O + L0 + L1 + M + N + P) or D5)) | (A + (D0 or (m1\*D1+m2\*D2)) + E + F0 + n\*F1 + G + H + J0 + J1 + J2 + K + O + N + P) | m1\*D1 + m2\*D2 + ((m3\*D3+m4\*D4) or m5\*(D5 or D6)) + E + n\*F1 + G + H  + J0 + J1 + J2 + K + O + L0 + L1 + M + P | Note 2, Note 3, Note 4, Note 5, Note 6, Note 7, Note 8, Note 9, Note 10, Note 11, Note 12, Note13, Note 14 | | Note 1: UE is not required to decode more than two PDSCH simultaneously, and decoding prioritization when more than two are received is up to UE implementation.  Note 2: For PCell, UE is not required to decode SI-RNTI PDSCH simultaneously with C-RNTI PDSCH, unless in FR1.  Note 3: Supported combinations are subject to UE capabilities for dual connectivity, carrier aggregation, receiving of group TPC commands, pre-emption indication and dynamic SFI monitoring.  Note 4: The values of m2 ≥ 0 and n≥ 0 in the supported combinations are subject to the UE capability.  Note 5: Support of monitoring PDCCH with SL-RNTI, SL-CS-RNTI, SL Semi-Persistent Scheduling V-RNTI are subject to UE capability.  Note 6: The values of m1 ≥ 1 in the supported combinations are subject to the UE capability.  Note 7: In Active time, a UE is not expected to monitor the DCI format for the PDCCH scrambled by PS-RNTI.  Note 8: The PDCCH scrambled by PS-RNTI can only be configured on the PCell and PSCell.  Note 9: For a UE supporting MBS multicast reception, the values of 1 ≥ m3 ≥ 0 and m4 ≥ 0 are subject to UE capability and applicable to RRC connected UEs. If m3 = 1, then m1 ≤ 1.  Note 10: For a UE supporting MBS multicast or broadcast reception, the UE is not expected to be configured simultaneously with more than one component carrier for multicast or broadcast reception.  Note 11: For a UE supporting MBS broadcast reception, the values of 1≥m5 ≥ 0 are subject to UE capability and applicable to RRC connected UEs. If m5=1, then m1≤1.  Note 12: For a UE supporting MBS broadcast reception in RRC\_CONNECTED state, it is required to support reception of FDMed MCCH PDSCH and PBCH in Pcell.  Note 13: For a UE supporting MBS multicast or broadcast reception in RRC\_CONNECTED state, it is not required to support reception of FDMed MCCH PDSCH/broadcast MTCH PDSCH/multicast MTCH PDSCH and SIB PDSCH in PCell.  Note 14: For a UE supporting MBS multicast or broadcast reception in RRC\_CONNECTED state, it is not required to support reception of FDMed broadcast MTCH PDSCH/multicast MTCH PDSCH and PBCH in PCell. | | | | |
| Huawei [R1-2210210] | |  |  |  |  | | --- | --- | --- | --- | | 3. RRC\_CONNECTED | | | | | (A + ((C0 + (B and/or (D0 or (m1\*D1+m2\*D2+((m3\*D3+m4\*D4) or m5\*(D5 or D6))))) + E + F0 + n\*F1 + G + H + J0 + J1 + J2 + K + O + L0 + L1 + M + N + P) or D5)) | (A + (D0 or (m1\*D1+m2\*D2)) + E + F0 + n\*F1 + G + H + J0 + J1 + J2 + K + O + N + P) | m1\*D1 + m2\*D2 + ((m3\*D3+m4\*D4) or m5\*(D5 or D6)) + E + n\*F1 + G + H  + J0 + J1 + J2 + K + O + L0 + L1 + M + P | Note 2, Note 3, Note 4, Note 5, Note 6, Note 7, Note 8, Note 9, Note 10, Note 11, Note 12, Note 13, Note 14 | | Note 1: UE is not required to decode more than two PDSCH simultaneously, and decoding prioritization when more than two are received is up to UE implementation.  Note 2: For PCell, UE is not required to decode SI-RNTI PDSCH simultaneously with C-RNTI PDSCH, unless in FR1.  Note 3: Supported combinations are subject to UE capabilities for dual connectivity, carrier aggregation, receiving of group TPC commands, pre-emption indication and dynamic SFI monitoring.  Note 4: The values of m2 ≥ 0 and n≥ 0 in the supported combinations are subject to the UE capability.  Note 5: Support of monitoring PDCCH with SL-RNTI, SL-CS-RNTI, SL Semi-Persistent Scheduling V-RNTI are subject to UE capability.  Note 6: The values of m1 ≥ 1 in the supported combinations are subject to the UE capability.  Note 7: In Active time, a UE is not expected to monitor the DCI format for the PDCCH scrambled by PS-RNTI.  Note 8: The PDCCH scrambled by PS-RNTI can only be configured on the PCell and PSCell.  Note 9: For a UE supporting MBS multicast reception, the values of 1 ≥ m3 ≥ 0 and m4 ≥ 0 are subject to UE capability and applicable to RRC connected UEs. If m3 = 1, then m1 ≤ 1.  Note 10: For a UE supporting MBS multicast or broadcast reception, the UE is not expected to be configured simultaneously with more than one component carrier for multicast or broadcast reception.  Note 11: For a UE supporting MBS broadcast reception, the values of 1≥m5 ≥ 0 are subject to UE capability and applicable to RRC connected UEs. If m5=1, then m1≤1.  Note 12: For a UE supporting MBS broadcast reception in RRC\_CONNECTED state, it is required to support reception of FDMed MCCH PDSCH and PBCH in PCell.  Note 13: For a UE supporting MBS multicast or broadcast reception in RRC\_CONNECTED state, it is not required to support reception of FDMed MCCH/MTCH/multicast PDSCH and SIB PDSCH in PCell.  Note 14: For a UE supporting MBS multicast or broadcast reception in RRC\_CONNECTED state, it is not required to support reception of FDMed MTCH/multicast PDSCH and PBCH in PCell. | | | | |

**CR to TS 38.213:**

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| CMCC[R1-2209311] | **Proposal 1: Delete the following sentences in TS 38.213 v17.3.0 section 18:**   * **Reason for change**   + The agreements of simultaneously and non-simultaneously PDSCH reception for RRC\_CONNECTED/IDLE/INATCIVE UEs have been captured in TS 38.214 h30 which the following sentences are redundant in TS 38.213 h30. In addition, the related agreements are not fully captured in TS 38.213 h30 as well. * **Summary of change**   + Delete the following sentences in TS 38.213 h30. * **Consequences if not approved**   + Some simultaneously and non-simultaneously PDSCH reception cases are misaligned between TS 38.214 and TS 38.213.   ---------------------- Start of TP -----------  18 Multicast Broadcast Services  **<**Unchanged text is omitted>  ~~A UE is not required to simultaneously receive PDSCHs for MCCH or MTCH on two serving cells. A UE is not required to simultaneously receive on a serving cell~~  ~~- PDSCHs for MCCH and MTCH, or~~  ~~- more than one MTCH PDSCHs, or~~  ~~- PDSCH for MTCH and PBCH, or~~  ~~- PDSCH for MCCH or MTCH and PDSCH scheduled by a DCI format 1\_0 with CRC scrambled by SI-RNTI or by P-RNTI~~  ~~A UE in the RRC\_CONNECTED state is not required to simultaneously receive on a serving cell~~  ~~- PDSCHs for MCCH or MTCH and multicast PDSCH, or~~  ~~- more than one multicast PDSCHs, or~~  ~~- multicast PDSCH and PBCH, or~~  ~~- PDSCH for MCCH or MTCH or multicast PDSCH and PDSCH scheduled by a DCI format 1\_0 with CRC scrambled by RA-RNTI~~  **<**Unchanged text is omitted>  ---------------------- End of TP ----------- |
| Huawei[R1-2210208] | 18 Multicast Broadcast Services  This clause is applicable only for PDCCH receptions, PDSCH receptions, and PUCCH transmissions for MBS on a serving cell. DCI formats with CRC scrambled by G-RNTI or G-CS-RNTI scheduling PDSCH receptions are referred to as multicast DCI formats and the PDSCH receptions are referred to as multicast PDSCH receptions. DCI formats with CRC scrambled by MCCH-RNTI or G-RNTI for MTCH scheduling PDSCH receptions are referred to as broadcast DCI formats and the PDSCH receptions are referred to as broadcast PDSCH receptions. HARQ-ACK information associated with multicast DCI formats or multicast PDSCH receptions is referred to as multicast HARQ-ACK information.  A UE can be provided one or more G-RNTIs per serving cell for scrambling the CRC of multicast DCI formats for scheduling PDSCH receptions. The UE can be provided one or more G-CS-RNTI per serving cell for scrambling the CRC of multicast DCI formats providing activation/release for SPS PDSCH receptions.  A UE can be configured by *cfr-ConfigMCCH-MTCH* an MBS frequency resource for PDCCH and PDSCH receptions providing MCCH and MTCH [12, TS 38.331]; otherwise, the MBS frequency resource is same as for the CORESET with index 0 that is associated with the Type0-PDCCH CSS set for PDCCH and PDSCH receptions providing MCCH and MTCH. A UE monitors PDCCH for scheduling PDSCH receptions for MCCH or MTCH as described in clause 10.1.  In clauses referring to a higher layer parameter value provided by *PDCCH-ConfigCommon* or *PDSCH-ConfigCommon*, when applicable a corresponding higher layer parameter value for MCCH/MTCH PDCCH receptions or PDSCH receptions, respectively, is provided as described in [12, TS 38.331].  < Unchanged parts are omitted > |
| ZTE[R1-2209473] | Multicast Broadcast Services <Unchanged parts are omitted>  A UE in RRC\_CONNECTED state is required to simultaneously receive PDSCH for MCCH and PBCH.  A UE is not required to simultaneously receive PDSCHs for MCCH or MTCH on two serving cells. A UE is not required to simultaneously receive on a serving cell  - PDSCHs for MCCH and MTCH, or  - more than one MTCH PDSCHs, or  - PDSCH for MTCH and PBCH, or  - PDSCH for MCCH or MTCH and PDSCH scheduled by a DCI format 1\_0 with CRC scrambled by SI-RNTI or by P-RNTI  - PDSCH for MCCH or MTCH and PDSCH scheduled by a DCI format 1\_0 with CRC scrambled by RA-RNTI  A UE in the RRC\_CONNECTED state is not required to simultaneously receive on a serving cell  - PDSCHs for MCCH or MTCH and multicast PDSCH, or  - more than one multicast PDSCHs, or  - multicast PDSCH and PBCH, or  - PDSCH for MCCH or MTCH ~~or multicast PDSCH~~ and PDSCH scheduled by a DCI format 1\_0 with CRC scrambled by RA-RNTI  - multicast PDSCH and PDSCH scheduled by a DCI format 1\_0 with CRC scrambled by RA-RNTI, SI-RNTI or by P-RNTI  <Unchanged parts are omitted> |

**CR to TS 38.214:**

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| Huawei[R1-2210209] | < Unchanged parts are omitted >  The UE is not expected to decode a PDSCH in a serving cell scheduled by a PDCCH with C-RNTI, CS-RNTI or MCS-C-RNTI and one or multiple PDSCH(s) required to be received according to this Clause in the same serving cell without a corresponding PDCCH transmission if the PDSCHs partially or fully overlap in time except if the PDCCH scheduling the PDSCH ends at least 14 symbols before the earliest starting symbol of the PDSCH(s) without the corresponding PDCCH transmission, where** and the symbol duration are based on the smallest numerology between the scheduling PDCCH and the PDSCH, in which case the UE shall decode the PDSCH scheduled by the PDCCH. When the PDCCH reception incudes two PDCCH candidates from two respectvie search space sets, as described in clause 10 of [6, TS 38.213], for the purpose of determining the PDCCH with C-RNTI, CS-RNTI or MCS-C-RNTI scheduling the PDSCH ends at least 14 symbols before the earliest starting symbol of the PDSCH(s) without the corresponding PDCCH transmission, the PDCCH candidate that ends later in time is used.  The UE is not expected to decode a PDSCH scheduled with C-RNTI, MCS-C-RNTI, G-RNTI for multicast or broadcast, MCCH-RNTI, G-GS-RNTI or CS-RNTI if another PDSCH in the same cell scheduled with RA-RNTI or MSGB-RNTI partially or fully overlap in time.  The UE in RRC\_IDLE and RRC\_INACTIVE modes shall be able to decode two PDSCHs each scheduled with SI-RNTI, P-RNTI, RA-RNTI or TC-RNTI, with the two PDSCHs partially or fully overlapping in time in non-overlapping PRBs.  The UE:  - is expected to decode PDSCH scheduled with MCCH-RNTI and PBCH in PCell that partially or fully overlaps in time in non-overlapping PRBs in PCell.  - is not expected to decode PDSCH scheduled with broadcast G-RNTI and PBCH in PCell that partially or fully overlaps in time in non-overlapping PRBs in PCell.  - is not expected to decode PDSCH scheduled with multicast G-RNTI and PBCH in PCell that partially or fully overlaps in time in non-overlapping PRBs in PCell.  On a frequency range 1 cell, the UE shall be able to decode a PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI and, during a process of P-RNTI triggered SI acquisition, another PDSCH scheduled with SI-RNTI that partially or fully overlap in time in non-overlapping PRBs, unless the PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI requires Capability 2 processing time according to clause 5.3 in which case the UE may skip decoding of the scheduled PDSCH with C-RNTI, MCS-C-RNTI, or CS-RNTI.  On a frequency range 2 cell, the UE is not expected to decode a PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI if in the same cell, during a process of P-RNTI triggered SI acquisition, another PDSCH scheduled with SI-RNTI partially or fully overlap in time.  The UE is expected to decode a PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI during a process of autonomous SI acquisition.  The maximum number of PDSCHs scheduled per slot per component carrier with C-RNTI/CS-RNTI and G-RNTI/G-CS-RNTI/MCCH-RNTI that the UE shall be able to decode is the same as the indicated UE capability for the number of unicast PDSCHs per slot per component carrier. If the UE is capable of receiving FDMed unicast and multicast PDSCH per slot per carrier, the UE shall be able to decode a PDSCH scheduled with C-RNTI/CS-RNTI and a PDSCH scheduled with G-RNTI for multicast/G-CS-RNTI that partially or fully overlap in time in non-overlapping PRBs. If the UE is capable of receiving FDMed unicast and broadcast PDSCH per slot per carrier, the UE shall be able to decode a PDSCH scheduled with C-RNTI/CS-RNTI and a PDSCH scheduled with G-RNTI for broadcast/MCCH-RNTI that partially or fully overlap in time in non-overlapping PRBs.  If the UE is configured by higher layers to decode a PDCCH with its CRC scrambled by a CS-RNTI or G-CS-RNTI, the UE shall receive PDSCH transmissions without corresponding PDCCH transmissions using the higher-layer-provided PDSCH configuration for those PDSCHs.  The UE it is not expected to support reception of FDMed MCCH PDSCH and MTCH PDSCH in PCell or SCell, or FDMed multiple MTCH PDSCHs in PCell or SCell, or FDMed MCCH/MTCH/multicast PDSCH and SIB PDSCH in PCell, or FDMed multicast PDSCHs in PCell or SCell, or FDMed multicast PDSCH and MCCH/MTCH for broadcast in PCell or SCell, or FDMed MCCH/MTCH/multicast PDSCH and paging PDSCH.  < Unchanged parts are omitted > |

### Round-1

***FL’s analysis:***

**Regarding CR to TS 38.202:**

We had the following agreements:

Agreement

For RRC\_IDLE/INACTIVE UEs, a UE is required to support reception of FDMed MCCH PDSCH and PBCH in PCell.

Agreement

For RRC\_IDLE/INACTIVE UEs, a UE is not required to support reception of FDMed MTCH PDSCH and PBCH in PCell.

Agreement:

For RRC\_CONNECTED UEs,

* a UE is not required to support reception of FDMed MCCH/MTCH/multicast PDSCH and SIB PDSCH in Pcell.
* a UE is required to support reception of FDMed MCCH PDSCH and PBCH in Pcell.
* a UE is not required to support reception of FDMed MTCH PDSCH and PBCH in Pcell.
* a UE is not required to support reception of FDMed multicast PDSCH and PBCH in Pcell.

**Agreement**

For RRC\_IDLE/INACTIVE UEs, a UE is not required to support reception of FDMed MCCH/MTCH PDSCH and SIB PDSCH in PCell.

Two companies [MTK, Huawei] propose the similar adding notes to reflect the above agreements to TS 38.202, otherwise the current description of the combination of (B and/or (D0 or (m1\*D1+m2\*D2+((m3\*D3+m4\*D4) or m5\*(D5 or D6)) may imply UE is required to support FDMed MCCH/MTCH/Multicast and SIB or FDMed MTCH/multicast with PBCH. Considering the only difference of two CRs is the wording of “MTCH/broadcast MTCH” and “multicast PDSCH/multicast MTCH PDSCH” , FL suggests taking [MTK]’s CR R1-2209524 as the baseline for themoderator draft CR to declare the PDSCH type clearer.

**Regarding CR to TS 38.213:**

Two companies [CMCC, Huawei] propose the same CR to delete the duplicated paragraph in TS 38.213 since these agreements have been captured in TS 38.214 and the current wording in TS 38.213 is not complete as well. [ZTE] proposes to correctly reflect the related agreements in TS 38.213, but as the former explanation, FL accesses it is unnecessary to capture the same thin in two specifications and suggests takes [Huawei]’s CR as the baseline for the moderator draft CR.

**Regarding CR to TS 38.214:**

One company [Huawei] proposes a CR to TS 38.214 to delete “or FDMed MCCH/MTCH/multicast PDSCH and SIB1 PDSCH that partially or fully overlap in time in non-overlapping PRBs.” since SIB includes SIB1 and other SIBs, and correct “Pcell” to “ PCell” and “Scell” to “SCell”. A moderator draft CR is prepared based on the input R1-2210209.

#### Draft CR 3.1.1

**The draft CR in** [***Moderator Draft CR to TS 38.202 on issue 2-1***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20to%20TS%2038.202%20on%20issue%202-1_v000_Mod.docx) **is endorsed.**

***Company views:***

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| --- | --- |
| Company | Comments |
| Spreadtrum | Support |
| vivo | ok |
| NTT DOCOMO | OK |
| ZTE | Support |
| MTK | Support |
| Ericsson | OK |

#### Draft CR 3.1.2

**The draft CR in** [***Moderator Draft CR to TS 38.213 on issue 2-1***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20to%20TS%2038.213%20on%20issue%202-1_v000_Mod.docx) **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Support |
| vivo | ok |
| NTT DOCOMO | OK |
| ZTE | Support |
| Ericsson | OK |

#### Draft CR 3.1.3

**The draft CR in** [***Moderator Draft CR to TS 38.214 on issue 2-1***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20to%20TS%2038.214%20on%20issue%202-1_v000_Mod.docx) **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Support |
| vivo | ok |
| NTT DOCOMO | OK |
| ZTE | We suggest the following change for the draft CR to align the terminology in the spec. It is noted this is the same as the change in issue 2-15.  G-RNTI for multicast or broadcast => G-RNTI for multicast or MTCH |
|  |  |
| Ericsson | OK |

## Issue#2-2: maximum data rate for multiplexing MBS and unicast

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| --- | --- |
| Huawei[R1-2209833] | 5.1.3 Modulation order, target code rate, redundancy version and transport block size determination Within a cell group, a UE is not required to handle PDSCH(s) transmissions including unicast and/or multicast/broadcast in slot *sj* in serving cell-*j*, and for *j* = 0,1,2.. *J-1*, slot *sj* overlapping with any given point in time, if the following condition is not satisfied at that point in time:  where,  - *J* is the number of configured serving cells belonging to a frequency range  - for the *j-th* serving cell,  *- M* is the number of TB(s) transmitted in slot *sj*. If there are two PDSCH transmission occasions of the same TB (in time domain or in frequency domain) in the slot *sj*, each transmission occasion is counted separately.  *- Tslotμ(j)* =10-3/2*μ(j)*, where *μ(j)* is the numerology for PDSCH(s) in slot *sj* of the *j*-th serving cell.  - for the *m*-th TB,  *- A* is the number of bits in the transport block as defined in Clause 7.2.1 [5, TS 38.212]  *- C* is the total number of code blocks for the transport block defined in Clause 5.2.2 [5, TS 38.212].  *-*  is the number of scheduled code blocks for the transport block as defined in Clause 5.4.2.1 [5, TS 38.212]  - [Mbps] is computed as the maximum data rate summed over all the carriers in the frequency range for any signaled band combination and feature set consistent with the configured servings cells, where the data rate value is given by the formula in Clause 4.1.2 in [13, TS 38.306], including the scaling factor *f(i).*  For a *j-*th serving cell, if higher layer parameter *processingType2Enabled* of *PDSCH-ServingCellConfig* is configured for the serving cell and set to '*enable',* or if at least one *IMCS >* *W* for a PDSCH for unicast or multicast, where *W* = 28 for MCS tables 5.1.3.1-1 and 5.1.3.1-3, and *W* = 27 for MCS table 5.1.3.1-2, and *W* = 26 for MCS table 5.1.3.1-4, or for a j-th serving cell where UE supports FDM-ed unicast and MBS PDSCH, the UE is not required to handle PDSCH transmissions, if the following condition is not satisfied:  where  - is the number of symbols assigned to the PDSCH(s). For a PDSCH that consists of two PDSCH transmission occasions in time domain in one slot, is the number of symbols of one transmission occasion. For FDMed unicast and MBS PDSCH in one slot, is the total number of symbols of unicast and MBS PDSCH.  - M is the number of TB(s) in the PDSCH(s)  - where *μ* is the numerology of the PDSCH(s)  - for the *m*-th TB,  *- A* is the number of bits in the transport block as defined in Clause 7.2.1 [5, TS 38.212]  *- C* is the total number of code blocks for the transport block defined in Clause 5.2.2 [5, TS 38.212]  *-*  is the number of scheduled code blocks for the transport block as defined in Clause 5.4.2.1 [5, TS 38.212]  - [Mbps] is computed as the maximum data rate for a carrier in the frequency band of the serving cell for any signaled band combination and feature set consistent with the serving cell, where the data rate value is given by the formula in Clause 4.1.2 in [13, TS 38.306], including the scaling factor *f(i).* |
| Qualcomm[R1-2209956] | 5.1.3 Modulation order, target code rate, redundancy version and transport block size determination **<**Unchanged text is omitted>  For a *j-*th serving cell, if higher layer parameter *processingType2Enabled* of *PDSCH-ServingCellConfig* is configured for the serving cell and set to '*enable',* or if at least one *IMCS >* *W* for a PDSCH, where *W* = 28 for MCS tables 5.1.3.1-1 and 5.1.3.1-3, and *W* = 27 for MCS table 5.1.3.1-2, and *W* = 26 for MCS table 5.1.3.1-4, the UE is not required to handle PDSCH transmissions, if the following condition is not satisfied:  where  - is the number of symbols assigned to the PDSCH(s). For a PDSCH that consists of two PDSCH transmission occasions in time domain in one slot, is the number of symbols of one transmission occasion. For FDMed unicast and MBS PDSCHs in one slot, is the total number of symbols of the unicast and MBS PDSCHs with fully or partially-overlapped in time domain.  - M is the number of TB(s) in the PDSCH(s)  - where *μ* is the numerology of the PDSCH(s)  - for the *m*-th TB,  *- A* is the number of bits in the transport block as defined in Clause 7.2.1 [5, TS 38.212]  *- C* is the total number of code blocks for the transport block defined in Clause 5.2.2 [5, TS 38.212]  *-*  is the number of scheduled code blocks for the transport block as defined in Clause 5.4.2.1 [5, TS 38.212]  - [Mbps] is computed as the maximum data rate for a carrier in the frequency band of the serving cell for any signaled band combination and feature set consistent with the serving cell, where the data rate value is given by the formula in Clause 4.1.2 in [13, TS 38.306], including the scaling factor *f(i).*  **<**Unchanged text is omitted> |
| Qualcomm [R1-2209957] | **Proposal 1:**   * **In case of FDMed unicast and MBS PDSCHs, UE can report an additional scaling factor with candidate value larger than legacy unicast for the max data rate and TBS LBRM for allocated TB(s) in a 14 consecutive-symbol duration.**  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **33. NR\_MBS** | **33-3-2a** | **Scalng factor for maximum data rate and TBS LBRM of FDMed unicast PDSCH and group-common PDSCH** | **Scaling factor for max data rate and TBS LBRM to support FDMed unicast PDSCH and group-common PDSCH per CC.** | **33-3-2** | **Yes** |  | **If not reported, same as the scaling factor for max data rate of unciast PDSCH** | **Per FSPC** | **N/A** | **N/A** |  | **value of scaling factor: {1.75, 1.5, 1, or 0.75}** | **Optional with capability signalling** |   **Proposal 2:**   * **Adopt the draft CR R1-2209958 for TS38.214 [1].** * **Send LS to RAN2 to adopt the TP#1 for TS38.306.**   + ***Reason for change: the max data rate for allocated TB(s) needs to be clarified in case of FDMed unicast and MBS PDSCHs.***   + ***Summary of change: to clarify the max data rate in case of FDMed unicast and MBS PDSCHs if UE can support the scaling factor fu+m.***   + ***Consequences if not approved: gNB cannot schedule any initial/retransmission of FDMed unicast and MBS TBs with sum rate over the unicast max data rate on one CC.***   ===start of TP#1 for TS38.306 ===  **<**Unchanged text is omitted> 4.1.2 Supported max data rate For NR, the approximate data rate for a given number of aggregated carriers in a band or band combination is computed as follows.  wherein  J is the number of aggregated component carriers in a band or band combination  Rmax = 948/1024  For the j-th CC,  is the maximum number of supported layers given by higher layer parameter *maxNumberMIMO-LayersPDSCH* for downlink and maximum of higher layer parameters *maxNumberMIMO-LayersCB-PUSCH* and *maxNumberMIMO-LayersNonCB-PUSCH* for uplink.  is the maximum supported modulation order given by higher layer parameter *supportedModulationOrderDL* for downlink and higher layer parameter *supportedModulationOrderUL* for uplink.  is the scaling factor given by higher layer parameter *scalingFactor* or*scalingFactor-1024QAM-FR1* and can take the values 1, 0.8, 0.75, and 0.4, or when the FDMed unicast and MBS PDSCH is configured, is the scaling factor given by higher layer parameter *scalingFactorFDM* and can take the values 1.75, 1.5, and 1, 0.75.  is the numerology (as defined in TS 38.211 [6])  **<**Unchanged text is omitted>  ===end of TP#2 for TS38.306 === |
| Qualcomm [R1-2209958] | 5.1.3 Modulation order, target code rate, redundancy version and transport block size determination **<**Unchanged text is omitted>  - The UE is not expected to handle any transport blocks (TBs) in a 14 consecutive-symbol duration for normal CP (or 12 for extended CP) ending at the last symbol of the latest PDSCH transmission within an active BWP on a serving cell whenever  If there is given by higher layer parameter *scalingFactorFDM* for the serving cell:  or  or  otherwise:  where, for the serving cell,  - S is the set of TBs belonging to PDSCH(s) that are partially or fully contained in the consecutive-symbol duration  - is the set of TBs belonging to unicast PDSCH(s) that are partially or fully contained in the consecutive-symbol duration  - is the set of TBs belonging to MBS multicast or broadcast PDSCH(s) that are partially or fully contained in the consecutive-symbol duration  - for the *i*th TB  *- Ci'* is the number of scheduled code blocks for as defined in [5, 38.212].  *- Li* is the number of OFDM symbols assigned to the PDSCH  *- xi* is the number of OFDM symbols of the PDSCH contained in the consecutive-symbol duration  - based on the values defined in Clause 5.4.2.1 [5, TS 38.212]  - is the starting location of RV for the th transmission  - of the scheduled code blocks for the transmission  - is the circular buffer length  - is the current (re)transmission for the *i*th TB  - corresponds to the subcarrier spacing of the BWP (across all configured BWPs of a carrier) that has the largest configured number of PRBs  - in case there is more than one BWP corresponding to the largest configured number of PRBs, *µ'* follows the BWP with the largest subcarrier spacing.  - corresponds to the subcarrier spacing of the active BWP  - RLBRM = 2/3 as defined in Clause 5.4.2.1 [5, TS 38.212]  - TBSLBRM as defined based on the parameters for unicast in Clause 5.4.2.1 [5, TS 38.212]  - X as defined for downlink max MIMO layer for unicast in Clause 5.4.2.1 [5, TS 38.212].  **<**Unchanged text is omitted> |

### Round-1

***FL’s analysis:***

**Regarding the reported scaling factor:**

This issue was discussed in several RAN1 meetings, but some companies are not convinced by the motivation to introduce the scaling factor for FDM case which larger than 1 which they think the > 1 scaling factor will beyond the theoretical maximum values for this CC.

Considering this situation is unchanged during the preparation phase discussion, FL suggests proposal 3.2.1 as a compromise that additional scaling factor can be reported for FDMed unicast and MBS, but the scaling factor can not be larger than 1.

**Regarding the CR on max date rate:**

In last RAN1 meeting, we agreed the following agreement, but for the case of FDMed unicast and MBS PDSCHs, the current spec still needs clarification from the submitted CRs whatever whether additional scaling factor for FDMed unicast and MBS is supported or not.

**Agreement**

At least in case of no FDMed unicast and MBS PDSCHs, the max data rate and upper bound of TBS LBRM for allocated TB(s) in a 14 consecutive-symbol duration is based on the unicast parameters.

Two companies Huawei[R1-2209833] and Qualcomm [R1-2209956] propose the CRs on this issue, most part are aligned between two CRs to adding the definition of L in max date rate calculation. In addition, [R1-2209833] also proposes some other clarification, a harmonized moderator draft CR is prepared based on these submitted CRs.

#### Proposal 3.2.1

**Additional scaling factor can be reported by UE for one CC when the FDMed unicast and MBS PDSCH is configured. The candidate values of scaling factor are 1, 0.8 and 0.75.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Not support. This is maintenance stage. The current spec is not broken. The optimization is not needed. |
| ZTE | Similar view as Spreadtrum. |
| Nokia, NSB | Not support, appears like an optimization. |
| MTK | Share the similar view with Spreadtrum/ZTE/Nokia |
| Ericsson | Not sure if the proposal is meaningful, since the scaling factor already support these values. |

#### Draft CR 3.2.1

**The draft CR in** [***Moderator Draft CR on issue 2-2***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20on%20issue%202-2_v000_Mod.docx) **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Ok |
| ZTE | OK |
| Nokia, NSB | OK |
| Ericsson | OK |

## Issue#2-3: PDCCH monitoring behavior when overlaps with rate matching pattern

|  |  |
| --- | --- |
| Huawei[R1-2208469] | 10.1 UE procedure for determining physical downlink control channel assignment  A set of PDCCH candidates for a UE to monitor is defined in terms of PDCCH search space sets. A search space set can be a CSS set or a USS set. A UE monitors PDCCH candidates in one or more of the following search spaces sets  < Unchanged parts are omitted >  If a UE is provided *resourceBlocks* and s*ymbolsInResourceBlock* in *RateMatchPattern* of *pdsch-Config or ServingCellConfig/ServingCellConfigCommon*, or if the UE is additionally provided *periodicityAndPattern* in *RateMatchPattern* of *pdsch-Config or ServingCellConfig/ServingCellConfigCommon*, the UE can determine a set of RBs in symbols of a slot that are not available for PDSCH reception scheduled by a DCI format as described in [6, TS 38.214]. If a PDCCH candidate that provides a DCI format is mapped to one or more REs that overlap with REs of any RB in the set of RBs in symbols of the slot, the UE does not expect to monitor the PDCCH candidate.  If a UE is provided *resourceBlocks* and s*ymbolsInResourceBlock* in *RateMatchPattern* of *pdsch-ConfigMulticast or pdsch-ConfigMCCH/pdsch-ConfigMTCH*, or if the UE is additionally provided *periodicityAndPattern* in *RateMatchPattern* of *pdsch-ConfigMulticast or pdsch-ConfigMCCH/pdsch-ConfigMTCH*, the UE can determine a set of RBs in symbols of a slot that are not available for PDSCH reception scheduled by a DCI format. If a PDCCH candidate that provides a DCI format is mapped to one or more REs that overlap with REs of any RB in the set of RBs in symbols of the slot, the UE does not expect to monitor the PDCCH candidate.  A UE does not expect to be configured with *dci-FormatsSL* and *dci-FormatsExt* in a same USS. |
| MediaTek[R1-2209525] | 10.1 UE procedure for determining physical downlink control channel assignment \*\*\* Unchanged text is omitted \*\*\*  If a UE is provided *resourceBlocks* and s*ymbolsInResourceBlock* in *RateMatchPattern* of *PDSCH-Config*, or if the UE is additionally provided *periodicityAndPattern* in *RateMatchPattern* of *PDSCH-Config*, the UE can determine a set of RBs in symbols of a slot that are not available for PDSCH reception scheduled by aDCI format as described in [6, TS 38.214]. If a PDCCH candidate that provides a DCI format is mapped to one or more REs that overlap with REs of any RB in the set of RBs in symbols of the slot, the UE does not expect to monitor the PDCCH candidate.  If a UE is provided *resourceBlocks* and s*ymbolsInResourceBlock* in *RateMatchPattern* of *PDSCH-Config-Multicast*, or if the UE is additionally provided *periodicityAndPattern* in *RateMatchPattern* of *PDSCH-Config-Multicast*, the UE can determine a set of RBs in symbols of a slot that are not available for PDSCH reception scheduled by a DCI format. If a PDCCH candidate that provides a DCI format is mapped to one or more REs that overlap with REs of any RB in the set of RBs in symbols of the slot, the UE does not expect to monitor the PDCCH candidate.  \*\*\* Unchanged text is omitted \*\*\* |
| Qualcomm[R1-2209961] | 10.1 UE procedure for determining physical downlink control channel assignment < Unchanged parts are omitted >  If a UE is provided *resourceBlocks* and s*ymbolsInResourceBlock* in *RateMatchPattern*, or if the UE is additionally provided *periodicityAndPattern* in *RateMatchPattern*, the UE can determine a set of RBs in symbols of a slot that are not available for PDSCH reception scheduled by a DCI format as described in [6, TS 38.214]. If a PDCCH candidate that provides a DCI format is mapped to one or more REs that overlap with REs of any RB in the set of RBs in symbols of the slot, the UE does not expect to monitor the PDCCH candidate.  A UE does not expect to be configured with *dci-FormatsSL* and *dci-FormatsExt* in a same USS.  < Unchanged parts are omitted > |

### Round-1

***FL’s analysis:***

The submitted CRs basically are proposing the similar changes to clarify the UE behavior that UE does not monitor PDCCH candidates with DCI format for unicast, multicast or broadcast if overlapping with the REs/RBs of the rate matching pattern configured for unicast, multicast, or broadcast. Considering the CR proposed by [Qualcomm] is the simplest, FL suggests take input R1-2209961 as the baseline of the moderator draft CR.

#### Draft CR 3.3.1

**The draft CR in** [***Moderator Draft CR on issue 2-3***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20on%20issue%202-3_v000_Mod.docx) **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| vivo | In RAN1 previous meetings, agreement for rate matching such as following agreement was achieved.  Agreement  For multicast RRC\_CONNECTED UEs, *rateMatchPatternToAddModList*, *rateMatchPatternGroup1* and *rateMatchPatternGroup2* can be configured in *PDSCH-Config-Multicast* for GC-PDSCH rate matching, subject to UE capability. For PDSCH resource mapping with RB symbol level granularity,   * + The procedure for PDSCH scheduled by PDCCH with DCI format 4\_1is similar as that of DCI format 1\_0 and the procedure for PDSCH scheduled by PDCCH with DCI format 4\_2is similar as that of DCI format 1\_1, by applying the parameters of *rateMatchPatternToAddModList*, *rateMatchPatternGroup1* and *rateMatchPatternGroup2* configured in *PDSCH-Config-Multicast*.   + *rateMatchPatternToAddModList*, *rateMatchPatternGroup1* and *rateMatchPatternGroup2* configured in *PDSCH-Config* for unicast do not apply for GC-PDSCHs.   + *rateMatchPatternToAddModList*, *rateMatchPatternGroup1* and *rateMatchPatternGroup2* configured in *PDSCH-Config-Multicast* for multicast do not apply for unicast PDSCHs.   Based on the last two bullets, the *rateMatchPattern* is separately configured and independent for PDSCH. For PDCCH, we think same rule can be followed. |
| ZTE | We are fine with the draft CR. |
| MTK | Support the CR.  The above agreement mentioned by vivo is about the PDSCH rate matching pattern, and the current CR is to clarify whether the UE needs to monitor the PDCCH if the MBS(Unicast) PDSCH RM patten overlap with unicast(MBS) PDCCH. Please not that in the legacy behavior, the UE is not required to the PDCCH if it overlap with RM pattern, so, the similar mechanism can be reused for the two cases and also make UE’s behavior clear. |
| Ericsson | OK |
| Huawei, HiSilicon | Ok with the moderator CR. Agree with MTK, handling the RM for PDSCH and PDCCH is different because UE can know it is unicast DCI or multicast DCI only after decoding the DCI. Whether UE monitors PDCCH should not depend on whether the RM is for unicast or for multicast. |

## Issue#2-4: FDRA determination of multicast DCI formats

|  |  |
| --- | --- |
| Nokia[R1-2208701] | **Proposal 5: Adopt the following text proposal to TS38.212 v17.3.0:**   * **Reason for change:**   **Current TS38.212 v17.3.0 has a minor error in the formula to calculate the FDRA field for DCI formats 4\_0, 4\_1 and 4\_2. There is a minor typo for “CORESET 0” for DCI format 4\_0 as well.**   * **Summary of change:**   **Add a bracket at the end of the formula to make it correct, as well as correcting a minor typographical error.**   * **Consequence if not approved:**   **Possible incorrect formula is used, leading to incorrect calculation of FDRA field size.**  ---------------------- Text proposal to TS38.212 v17.3.0 Starts -----------  \*\*\* Unchanged text is omited \*\*\*  7.3.1.5.1 Format 4\_0  DCI format 4\_0 is used for the scheduling of PDSCH for broadcast in DL cell.  The following information is transmitted by means of the DCI format 4\_0 with CRC scrambled by MCCH-RNTI or G-RNTI for MTCH configured by *MBS-SessionInfo*:  - Frequency domain resource assignment – bits where equals to  - the size of CORESET 0 if CORESET 0 is configured for the cell; and  - the size of initial DL bandwidth part if CORES**E**T**~~E~~** 0 is not configured for the cell.  - Time domain resource assignment – 4 bits as defined in Clause 5.1.2.1 of [6, TS38.214]  - VRB-to-PRB mapping – 1 bit according to Table 7.3.1.2.2-5  - Modulation and coding scheme – 5 bits as defined in Clause 5.1.3 of [6, TS38.214]  - Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2  - MCCH change notification – 2 bits as defined in Clause x.x.x of [8, TS38.321] if the CRC of the DCI format 4\_0 is scrambled by MCCH-RNTI. Otherwise, this bit field is reserved.  - Padding bits, if required  Zeros shall be appended to DCI format 4\_0 until the payload size equals that of DCI format 1\_0 monitored in common search space in the same serving cell.  7.3.1.5.2 Format 4\_1  DCI format 4\_1 is used for the scheduling of PDSCH for multicast in DL cell.  The following information is transmitted by means of the DCI format 4\_1 with CRC scrambled by G-RNTI configured by *G-RNTI-Config* or G-CS-RNTI:  - Frequency domain resource assignment – bits where equals to   * the size of CORESET 0 if CORESET 0 is configured for the cell; and * the size of initial DL bandwidth part if CORESET 0 is not configured for the cell.   - Time domain resource assignment – 4 bits as defined in Clause 5.1.2.1 of [6, TS38.214]  - VRB-to-PRB mapping – 1 bit according to Table 7.3.1.2.2-5  - Modulation and coding scheme – 5 bits as defined in Clause 5.1.3 of [6, TS38.214]  - New data indicator – 1 bit  - Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2  - HARQ process number – 4 bits  - Downlink assignment index – 2 bits as defined in Clause 9.1.3 of [5, TS 38.213], as counter DAI  - PUCCH resource indicator – 3 bits as defined in Clause 9.2.3 of [5, TS38.213]  - PDSCH-to-HARQ\_feedback timing indicator – 3 bits as defined in Clause 9.2.3 of [5, TS38.213]  - Reserved bits – 3 bits  7.3.1.5.3 Format 4\_2  DCI format 4\_2 is used for the scheduling of PDSCH in DL cell.  The following information is transmitted by means of the DCI format 4\_2 with CRC scrambled by G-RNTI configured by *G-RNTI-Config* or G-CS-RNTI:  - Frequency domain resource assignment – number of bits determined by the following, where is the size of the common frequency resource as configured by higher layer parameter *locationAndBandwidth-Multicast*:  - bits if only resource allocation type 0 is configured, where is defined in Clause 5.1.2.2.1 of [6, TS38.214],  - bits if only resource allocation type 1 is configured, or  - bits if *resourceAllocation* in *PDSCH-Config-Multicast* is configured as '*dynamicSwitch'*.  - If *resourceAllocation* in *PDSCH-Config-Multicast* is configured as '*dynamicSwitch'*, the MSB bit is used to indicate resource allocation type 0 or resource allocation type 1, where the bit value of 0 indicates resource allocation type 0 and the bit value of 1 indicates resource allocation type 1.  - For resource allocation type 0, the LSBs provide the resource allocation as defined in Clause 5.1.2.2.1 of [6, TS 38.214].  - For resource allocation type 1, the LSBs provide the resource allocation as defined in Clause 5.1.2.2.2 of [6, TS 38.214]  \*\*\* Unchanged text is omited \*\*\*  ---------------------- Text proposal to TS38.212 v17.3.0 Ends ----------- |

### Round-1

***FL’s analysis:***

This issue is a very simple and easy to correct the minor typo in the formula to calculate the FDRA field with a missing bracket sign. A moderator draft CR is prepared based on this TP.

#### Draft CR 3.4.1

**The draft CR in** [***Moderator Draft CR on issue 2-4***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20on%20issue%202-4_v000_Mod.docx) **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Support |
| vivo | ok |
| NTT DOCOMO | OK |
| ZTE | It should be editor alignment CR. |
| Nokia, NSB | OK |
| MTK | ok |
| Ericsson | OK |

## Issue#2-5: SS0 availability for scheduling MBS

|  |  |
| --- | --- |
| Huawei[R1-2208470] | 10.1 UE procedure for determining physical downlink control channel assignment  A set of PDCCH candidates for a UE to monitor is defined in terms of PDCCH search space sets. A search space set can be a CSS set or a USS set. A UE monitors PDCCH candidates in one or more of the following search spaces sets  - a Type0-PDCCH CSS set on the primary cell of the MCG configured by  - *pdcch-ConfigSIB1* in MIB or by *searchSpaceSIB1* in *PDCCH-ConfigCommon* or by *searchSpaceZero* in *PDCCH-ConfigCommon* for a DCI format 1\_0 with CRC scrambled by a SI-RNTI, or  - *searchSpaceZero* in *searchSpaceMCCH* and *searchSpaceMTCH* for a DCI format 4\_0 with CRC scrambled by a MCCH-RNTI or a G-RNTI for MTCH  - a Type0A-PDCCH CSS set configured by *searchSpaceOtherSystemInformation* in *PDCCH-ConfigCommon* for a DCI format 1\_0 with CRC scrambled by a SI-RNTI on the primary cell of the MCG  - a Type0B-PDCCH CSS set configured by *searchSpaceMCCH* and *searchSpaceMTCH* for a DCI format 4\_0 with CRC scrambled by a MCCH-RNTI or a G-RNTI for MTCH, on the primary cell of the MCG  - a Type1-PDCCH CSS set configured by *ra-SearchSpace* in *PDCCH-ConfigCommon* for a DCI format 1\_0 with CRC scrambled by a RA-RNTI, a MsgB-RNTI, or a TC-RNTI on the primary cell  - a Type1A-PDCCH CSS set configured by *sdt-SearchSpace* in *PDCCH-ConfigCommon* for a DCI format with CRC scrambled by a C-RNTI or a CS-RNTI on the primary cell as described in clause 19.1  - a Type2-PDCCH CSS set configured by *pagingSearchSpace* in *PDCCH-ConfigCommon* for a DCI format 1\_0 with CRC scrambled by a P-RNTI on the primary cell of the MCG  - a Type2A-PDCCH CSS set configured by *peiSearchSpace* in *DownlinkConfigCommonSIB* for a DCI format 2\_7 with CRC scrambled by a PEI-RNTI on the primary cell of the MCG  - a Type3-PDCCH CSS set configured by  - *SearchSpace* in *PDCCH-Config* with *searchSpaceType* = *common* for DCI formats with CRC scrambled by INT-RNTI, SFI-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI, or CI-RNTI and, only for the primary cell, C-RNTI, MCS-C-RNTI, CS-RNTI(s), or PS-RNTI, or  - *SearchSpace* in *PDCCH-ConfigMulticast* for DCI formats with CRC scrambled by G-RNTI, or G-CS-RNTI, or  - *searchSpaceMCCH* and *searchSpaceMTCH* on a secondary cell for a DCI format 4\_0 with CRC scrambled by a MCCH-RNTI or a G-RNTI for MTCH, and  - a USS set configured by  - *SearchSpace* in *PDCCH-Config* with *searchSpaceType* = *ue-Specific* for DCI formats with CRC scrambled by C-RNTI, MCS-C-RNTI, SP-CSI-RNTI, CS-RNTI(s), SL-RNTI, SL-CS-RNTI, or SL Semi-Persistent Scheduling V-RNTI  < Unchanged parts are omitted > |

### Round-1

***FL’s analysis:***

The defination of searchSpaceMCCH and searchSpaceMTCH In TS38.331 v17.2.0 are as the following:

|  |
| --- |
| ***searchSpaceMCCH***  ID of the search space for MCCH. If the field is absent, the UE does not receive MCCH in this BWP (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial downlink BWP, if it does not include CD-SSB and the entire CORESET#0. |
| ***searchSpaceMTCH***  ID of the search space for MTCH of MBS broadcast. If the field is absent, the UE applies *searchSpaceMCCH* also for MTCH, (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial downlink BWP, if it does not include CD-SSB and the entire CORESET#0. |

However, in TS 38.123 v17.3.0, the UE behavior of whether UE monitors DCI format 4\_0 in searchSpaceZero is different from TS 38.331, one company [Huawei] proposes a CR to correct it to TS 38.213 to align the UE behaviour between TS 38.331 and TS 38.213. The moderator draft CR is provided based on input R1-2208470.

#### Draft CR 3.5.1

**The draft CR in** [***Moderator Draft CR on issue 2-5***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20on%20issue%202-5_v000_Mod.docx) **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| ZTE | Suggest the following updates because either *searchSpaceMCCH* or *searchSpaceMTCH* can be configured as 0 (SS0).  - *searchSpaceZero* in *searchSpaceMCCH* ~~and~~ or *searchSpaceMTCH* for a DCI format 4\_0 with CRC scrambled by a MCCH-RNTI or a G-RNTI for MTCH |
| MTK | Seems ok to align with the TS38.331 v17.2.0. |
| Ericsson | OK |

## Issue#2-6: multicast rate-matching pattern configuration

|  |  |
| --- | --- |
| CMCC[R1-2209313] | 5.1.4.1 PDSCH resource mapping with RB symbol level granularity  ========================= Unchanged parts =========================  A UE may be configured with any of the following higher layer parameters indicating REs declared as not available for PDSCH:  - *rateMatchPatternToAddModList* given by *PDSCH-Config*, by *PDSCH-ConfigMulticast*, by *ServingCellConfig* or by *ServingCellConfigCommon*, or by *PDSCH-Config-MCCH or PDSCH-Config-MTCH* and configuring up to 4 *RateMatchPattern(s)* per BWP and up to 4 *RateMatchPattern(s)* per serving-cell. The *RateMatchPattern(s)* configured for MBS multicast is counted into the ones that are configured per BWP. The *RateMatchPattern(s)* configured for MBS broadcast is counted into the ones that are configured per serving-cell. A *RateMatchPattern* may contain:  ========================= Unchanged parts ========================= |

### Round-1

***FL’s analysis:***

The number of RateMatchPattern configured in multicast CFR can be one according to the TS 38.331 RRC configuration parameter, but the description in TS 38.214 restricts that only more than one RateMatchPatterns can be configured in multicast CFR.

rateMatchPatternToAddModList SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern

The moderator draft CR is provided based on input R1-2209313.

#### Draft CR 3.6.1

**The draft CR in** [***Moderator Draft CR on issue 2-6***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20on%20issue%202-6_v000_Mod.docx) **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| vivo | The CR seems not needed. There seems a common understanding that a noun in the plural form incudes one or more. |
| NTT DOCOMO | OK |
| ZTE | It should be editor alignment CR if needed. |
| Nokia, NSB | OK |
| Ericsson | Can be part of editorial changes. |

## Issue#2-7: CFR configuration and simultaneous configuration of multicast PDSCH on two serving cells

|  |  |
| --- | --- |
| ZTE[R1-2209471] | A UE can be configured, per DL BWP by *cfr-ConfigMulticast*, an MBS frequency resource within the DL BWP for PDCCH and PDSCH receptions [4, TS 38.211]. If *cfr-ConfigMulticast* does not include *locationAndBandwidthMulticast*, the MBS frequency resource is the ~~active~~ DL BWP. ~~The UE is not required to simultaneously receive PDSCHs on two serving cells.~~ In clauses referring to a higher layer parameter value provided by *PDCCH-Config* or *PDSCH-Config* or *SPS-Config* for a DL BWP, when applicable a corresponding higher layer parameter value for multicast PDCCH, PDSCH, or SPS PDSCH receptions is provided as described in [12, TS 38.331]. |
| CATT[TP#2 in R1-2208927] | **Proposal 2: Adopt the following TP#2 to TS 38.213.**   * **Reason for change:**    + **RAN1 agreed that the UE is not required to be configured PDSCHs on two serving cells. The current specification doesn’t align with the agreement, which allows the UE is configured PDSCH on two serving cells and only receives PDSCH on one serving cell.** * **Summary of change:**    + **Modifying ‘simultaneously receive’ to ‘be configured to receive’.** * **Consequences if not approved:**    + **The description of simultaneous configuration of multicast PDSCH on two serving cells doesn’t align with the agreement.**  |  | | --- | | --------------------------------------TP to TS38.213 v17.3.0 Starts------------------------------------------ 18 Multicast Broadcast Services <Unchanged part is omitted>  A UE can be configured, per DL BWP by *cfr-ConfigMulticast*, an MBS frequency resource within the DL BWP for PDCCH and PDSCH receptions [4, TS 38.211]. If *cfr-ConfigMulticast* does not include *locationAndBandwidthMulticast*, the MBS frequency resource is the active DL BWP. The UE is not required to be ~~simultaneously~~ configured to receive PDSCHs on two serving cells. In clauses referring to a higher layer parameter value provided by *PDCCH-Config* or *PDSCH-Config* or *SPS-Config* for a DL BWP, when applicable a corresponding higher layer parameter value for multicast PDCCH, PDSCH, or SPS PDSCH receptions is provided as described in [12, TS 38.331].  <Unchanged part is omitted> | |

### 3.7.1 Round-1

***FL’s analysis:***

Regarding the CFR location and bandwidth configuration, [ZTE] proposes the CR to clarify the location and bandwidth configuration of CFR is irrelevant to which DL BWP is activated. In addition, the current description seems meaning that the frequency resource of all the 4 CFRs is the active DL BWP if the CFR frequency resource is not configured.

Regarding the simultaneous reception of MBS on two serving cells, [ZTE] proposes to delete the related sentence since this has been captured in TS 38.331 as the following.

***cfr-ConfigMulticast***

UE specific common frequency resource configuration for MBS multicast for one dedicated BWP. This field can be configured within at most one serving cell.

[CATT] proposes to modify ‘simultaneously receive’ to ‘be configured to receive’. FL assesses the CR proposed by ZTE [R1-2209471] is simpler and suggests taking R1-2209471 as the baseline for themoderator draft CR.

#### Draft CR 3.7.1

**The draft CR in** [***Moderator Draft CR on issue 2-7***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20on%20issue%202-7_v000_Mod.docx)  **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| vivo | Ok with the change. |
| NTT DOCOMO | OK |
| ZTE | Support. |
| Nokia, NSB | OK |
| Ericsson | Suggest to change “is not required” to “is not expected”. Otherwise, the sentence sounds like the network does not have to configure the UE with PDSCH on two serving cells, but could. |

## 3.8 Issue#2-8: collision handling between SPS and DG for MBS

|  |  |
| --- | --- |
| CMCC[R1-2209314] | 5.1 UE procedure for receiving the physical downlink shared channel ========================= Unchanged parts =========================  The UE is not expected to decode a PDSCH in a serving cell scheduled by a PDCCH with C-RNTI, CS-RNTI, MCS-C-RNTI, G-RNTI, G-CS-RNTI or MCCH-RNTI and one or multiple PDSCH(s) required to be received according to this Clause in the same serving cell without a corresponding PDCCH transmission if the PDSCHs partially or fully overlap in time except if the PDCCH scheduling the PDSCH ends at least 14 symbols before the earliest starting symbol of the PDSCH(s) without the corresponding PDCCH transmission, where** and the symbol duration are based on the smallest numerology between the scheduling PDCCH and the PDSCH, in which case the UE shall decode the PDSCH scheduled by the PDCCH. When the PDCCH reception incudes two PDCCH candidates from two respectvie search space sets, as described in clause 10 of [6, TS 38.213], for the purpose of determining the PDCCH with C-RNTI, CS-RNTI, MCS-C-RNTI, G-RNTI, G-CS-RNTI or MCCH-RNTI scheduling the PDSCH ends at least 14 symbols before the earliest starting symbol of the PDSCH(s) without the corresponding PDCCH transmission, the PDCCH candidate that ends later in time is used.  ========================= Unchanged parts ========================= |

### 3.8.1 Round-1

***FL’s analysis:***

In Rel-15/16, only TDMed PDSCH is supported and the unicast dynamic grant PDSCH and unicast SPS PDSCH can not be overlapped, except the dynamic grant PDCCH is at least 14 symbols before the SPS PDSCH which UE receives the dynamic grant PDSCH in this case.

For Rel-17 MBS, the FDMed between unicast/multicast DG and multicast/unicast SPS is not supported by specification, we only need to consider the TDM overleaping cases between unicast/multicast/broadcast DG PDSCH and unicast/multicast SPS PDSCH and Rel-15/16 rule on unicast DG PDSCH and unicast SPS PDSCH collision can be reused in these cases. Thus, the moderator draft CR is provided based this input R1-2209314.

#### Draft CR 3.8.1

**The draft CR in** [***Moderator Draft CR on issue 2-8***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20on%20issue%202-8_v000_Mod.docx) **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Support |
| vivo | Based on our agreements, we have agreed to support the FDMed between unicast/multicast PDSCH, we are confused that this feature can only be support for unicast DG PDSCH and multicast PDSCH? What’s the difference for unicast SPS PDSCH+ multicast SPS PDSCH or unicast DG PDSCH+ multicast SPS PDSCH? In Rel-15, for TDMed PDSCHs, single capability is defined which includes both DG PDSCH and SPS PDSCH. |
| NTT DOCOMO | OK |
| ZTE | We suggest the following change for the draft CR to align the terminology in the spec. It is noted this is the same as the change in issue 2-15.  G-RNTI => G-RNTI for multicast or MTCH |
| Nokia, NSB | OK |
| Ericsson | Same view as vivo. Perhaps we should clarify first the support of FDM in question 3.14 and return to this draft CR afterward. |

## 3.9 Issue#2-9: multicast SPS activation validation when UE is only configured one multicast SPS

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ASUSTeK[R1-2210075] | 10.2 PDCCH validation for DL SPS and UL grant Type 2  A UE validates, for scheduling activation or scheduling release, a DL SPS assignment PDCCH or a configured UL grant Type 2 PDCCH if  - the CRC of a corresponding DCI format is scrambled with a CS-RNTI provided by *cs-RNTI* or a G-CS-RNTI provided by g-cs-RNTI, and  - the new data indicator field in the DCI format for the enabled transport block is set to '0', and  - the DFI flag field, if present, in the DCI format is set to '0', and  - the time domain resource assignment field in the DCI format indicates a row with single SLIV, and  - if validation is for scheduling activation and if the PDSCH-to-HARQ\_feedback timing indicator field in the DCI format is present, the PDSCH-to-HARQ\_feedback timing indicator field does not provide an inapplicable value from *dl-DataToUL-ACK-r16*.  If a UE is provided a single configuration for UL grant Type 2 PUSCH or for SPS PDSCH for unicast, validation of the DCI format is achieved if all fields for the DCI format are set according to Table 10.2-1 or Table 10.2-2.  If a UE is provided more than one configuration for UL grant Type 2 PUSCH or for SPS PDSCH or a single configuration for SPS PDSCH for multicast, a value of the HARQ process number field in a DCI format indicates an activation for a corresponding UL grant Type 2 PUSCH or for a SPS PDSCH configuration with a same value as provided by *ConfiguredGrantConfigIndex* or by *sps-ConfigIndex*, respectively. Validation of the DCI format is achieved if the RV field for the DCI format is set as in Table 10.2-3.  If a UE is provided more than one configuration for UL grant Type 2 PUSCH or for SPS PDSCH or a single configuration for SPS PDSCH for multicast  - if the UE is provided *ConfiguredGrantConfigType2DeactivationStateList* or *sps-ConfigDeactivationStateList*, a value of the HARQ process number field in a DCI format indicates a corresponding entry for scheduling release of one or more UL grant Type 2 PUSCH or SPS PDSCH configurations  - if the UE is not provided *ConfiguredGrantConfigType2DeactivationStateList* or *sps-ConfigDeactivationStateList*, a value of the HARQ process number field in a DCI format indicates a release for a corresponding UL grant Type 2 PUSCH or for a SPS PDSCH configuration with a same value as provided by *ConfiguredGrantConfigIndex* or by *sps-ConfigIndex*, respectively  Validation of the DCI format is achieved if all fields for the DCI format are set according to Table 10.2-4.  If validation is achieved, the UE considers the information in the DCI format as a valid activation or valid release of DL SPS or configured UL grant Type 2. If validation is not achieved, the UE discards all the information in the DCI format.  **Table 10.2-1: Special fields for single DL SPS or single UL grant Type 2 scheduling activation PDCCH validation when a UE is provided a single SPS PDSCH for unicast or UL grant Type 2 configuration in the active DL/UL BWP of the scheduled cell**   |  |  |  |  | | --- | --- | --- | --- | |  | **DCI format 0\_0/0\_1/0\_2** | **DCI format 1\_0/1\_2** | **DCI format 1\_1** | | HARQ process number  (if present) | set to all '0's | set to all '0's | set to all '0's | | Redundancy version  (if present) | set to all '0's | set to all '0's | For the enabled transport block: set to all '0's |   **Table 10.2-2: Special fields for single DL SPS or single UL grant Type 2 scheduling release PDCCH validation when a UE is provided a single SPS PDSCH for unicast or UL grant Type 2 configuration in the active DL/UL BWP of the scheduled cell**   |  |  |  | | --- | --- | --- | |  | **DCI format 0\_0/0\_1/0\_2** | **DCI format 1\_0/1\_1/1\_2** | | HARQ process number  (if present) | set to all '0's | set to all '0's | | Redundancy version  (if present) | set to all '0's | set to all '0's | | Modulation and coding scheme | set to all '1's | set to all '1's | | Frequency domain resource assignment | set to all '0's for FDRA Type 2 with  set to all '1's, otherwise | set to all '0's for FDRA Type 0 or for *dynamicSwitch*  set to all '1's for FDRA Type 1 |   **Table 10.2-3: Special fields for a single DL SPS or single UL grant Type 2 scheduling activation PDCCH validation when a UE is provided multiple DL SPS or UL grant Type 2 configurations in the active DL/UL BWP of the scheduled cell or when a UE is provided single DL SPS configuration for multicast in the active DL BWP of the scheduled cell**   |  |  |  |  | | --- | --- | --- | --- | |  | **DCI format 0\_0/0\_1/0\_2** | **DCI format 1\_0/1\_2/4\_1** | **DCI format 1\_1/4\_2** | | Redundancy version  (if present) | set to all '0's | set to all '0's | For the enabled transport block: set to all '0's |   **Table 10.2-4: Special fields for a single or multiple DL SPS and UL grant Type 2 scheduling release PDCCH validation when a UE is provided multiple DL SPS or UL grant Type 2 configurations in the active DL/UL BWP of the scheduled cell or when a UE is provided single DL SPS configuration for multicast in the active DL BWP of the scheduled cell**   |  |  |  | | --- | --- | --- | |  | **DCI format 0\_0/0\_1/0\_2** | **DCI format 1\_0/1\_1/1\_2/4\_1/4\_2** | | Redundancy version  (if present) | set to all '0's | set to all '0's | | Modulation and coding scheme | set to all '1's | set to all '1's | | Frequency domain resource assignment | set to all '0's for FDRA Type 2 with  set to all '1's, otherwise | set to all '0's for FDRA Type 0 or for *dynamicSwitch*  set to all '1's for FDRA Type 1 | |

### 3.9.1 Round-1

***FL’s analysis:***

If UE only configured with one multicast SPS, UE needs to check whether HPN and RV equals to all “0”s in SPS activation/deactivation DCI based on current TS 38.213. However, considering the multicast SPS is configured for a group of UEs and different UE may have different unicast SPS/CG configurations, gNB can not always guarantee the multicast SPS index = 0. To address that SPS index=0 can not be configured to UE which only supports one multicast SPS, [ASUSTeK] proposes the CR to correct the validation condition of multicast SPS activation/deactivation that even only one multicast SPS is configured, the HPN filed in activation/deactivation DCI are not set to all “0”s which other SPS index not equals to 0 can be configured to the single multicast SPS. The moderator draft CR is provided based on input R1-2210075.

#### Draft CR 3.9.1

**The draft CR in** [***Moderator Draft CR on issue 2-9***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/8.12(NR_MBS)/%5B110bis-e-R17-MBS-03%5D/Moderator%20Draft%20CR%20on%20issue%202-9_v000_Mod.docx) **is endorsed.**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| vivo | The CR proposed that for single configuration for SPS PDSCH for multicast, HARQ process number field is used to indicate the *sps-ConfigIndex* for activation/release. One issue is that if UE is only capable of one SPS PDSCH configuration, it seems SPS PDSCH would be configured in R15 way and there is no *sps-ConfigIndex* configured for the SPS PDSCH. How to understand the CR in this case? |
| ASUSTeK | According to the current RRC spec as below, even if only one Multicast SPS PDSCH is configured, *sps-ConfigIndex* is always configured and the value can be different from “0”. Therefore, HPN filed in activation/deactivation DCI should not be used for validation of setting to all “0”; otherwise the validation for Multicast SPS activation/deactivation could be always failed when the only one Multicast SPS PDSCH is *sps-ConfigIndex* = 1~7.  –      *CFR-ConfigMulticast*  The IE *CFR-ConfigMulticast* indicates UE specific common frequency resource configuration for multicast for one dedicated BWP.  ***CFR-ConfigMulticast* information element**  -- ASN1START  -- TAG-CFR-CONFIGMULTICAST-START  CFR-ConfigMulticast-r17::= SEQUENCE {      locationAndBandwidthMulticast-r17              INTEGER (0..37949)                       OPTIONAL,    -- Need S      pdcch-ConfigMulticast-r17                      PDCCH-Config                             OPTIONAL,    -- Need M      pdsch-ConfigMulticast-r17                      PDSCH-Config                             OPTIONAL,    -- Need M      sps-ConfigMulticastToAddModList-r17            SPS-ConfigMulticastToAddModList-r17      OPTIONAL,    -- Need N      sps-ConfigMulticastToReleaseList-r17           SPS-ConfigMulticastToReleaseList-r17     OPTIONAL     -- Need N  }  SPS-ConfigMulticastToAddModList-r17 ::= SEQUENCE (SIZE (1..8)) OF SPS-Config  SPS-ConfigMulticastToReleaseList-r17 ::= SEQUENCE (SIZE (1..8)) OF SPS-ConfigIndex-r16  -- TAG-CFR-CONFIGMULTICAST-STOP  -- ASN1STOP |
| ZTE | First this issue can be resolved by the network implementation. In addition, the change requires the UE to support activating and de-activating single SPS without checking the HPN field, which may have impact to the UE feature. We prefer not to make such change. |
| Ericsson | Agree with ZTE, network implementation can just make sure that config#0 is used for multicast for UEs supporting more than 1 config. |

## 3.10 Issue#2-10: CR on definition of G-CS-RNTI for SPS group-common PDSCH retransmission

|  |  |  |
| --- | --- | --- |
| CATT[TP#1 in R1-2208927] | **Proposal 1: Adopt the following TP#1 to TS 38.213.**   * **Reason for change:**    + **RAN1 agreed G-CS-RNTI is used for dynamic retransmission/activation/deactivation of SPS group-common PDSCH. However, in TS 38.213(v 17.3.0), only providing G-CS-RNTI for activation/deactivation of SPS group-common PDSCH is captured, while providing G-CS-RNTI for scheduling retransmission of SPS group-common PDSCH is not captured.** * **Summary of change:**    + **Adding the description of providing G-CS-RNTI for scheduling retransmission of SPS PDSCH.** * **Consequences if not approved:**    + **The agreement on G-CS-RNTI can’t be captured in the spec.**  |  | | --- | | --------------------------------------TP to TS38.213 v17.3.0 Starts------------------------------------------ 18 Multicast Broadcast Services <Unchanged part is omitted>  A UE can be provided one or more G-RNTIs per serving cell for scrambling the CRC of multicast DCI formats for scheduling PDSCH receptions. The UE can be provided one or more G-CS-RNTI per serving cell for scrambling the CRC of multicast DCI formats providing activation/release/scheduling retransmission for SPS PDSCH receptions.  <Unchanged part is omitted> | |

### 3.10.1 Round-1

***FL’s analysis:***

One company [CATT] proposes one TP to add the description of providing G-CS-RNTI for scheduling retransmission of SPS PDSCH.

As the preparation phase discussion, FL views this CR is not pursued, the following sentence in TS 38.213 has declared that G-CS-RNTI can be used for SPS GC-PDSCH retransmission.

*“For the first HARQ-ACK reporting mode and for a transport block that a UE received in a SPS PDSCH, a PDSCH reception providing a retransmission of the transport block can be scheduled either by a unicast DCI format using a CS-RNTI or by a multicast DCI format using a same G-CS-RNTI as the G-CS-RNTI of the initial transmission of the transport block [6, TS 38.214].”*

Thus, companies can share your views whether this issue is essential or not.

#### Question 3.10.1

**Whether the issue#2-10 is essential or not?**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Fine to have this CR to make spec more clear/readable. |
| vivo | ok |
| CATT | Support.  For the sentence of G-CS-RNTI definition, it misses the description of ‘providing scheduling retransmission for SPS PDSCH reception’. We believe the function of G-CS-RNTI for activation/release/scheduling retransmission should be treated equally in the spec. |
| ZTE | We are fine with this proposal. |
| Nokia, NSB | ok |
| Ericsson | OK. |

## 3.11 Issue#2-11/2-12/2-13/2-14: Alignment CR on RRC parameters correction in TS 38.211/38.212/38.213/38.214

**CR to TS 38.211:**

|  |  |
| --- | --- |
| CMCC[R1-2209315] | Align the following RRC parameter names in 38.211 with the RRC specification in 38.331:   * PDSCH-Config-Multicast *pdsch-ConfigMulticast* |

**CR to TS 38.212:**

|  |  |
| --- | --- |
| CMCC[R1-2209316] | Align the following RRC parameter names in 38.212 with the RRC specification in 38.331:   * *maxMIMO-Layers-Multicast* *maxMIMO-Layers* * PDSCH-Config-Multicast *pdsch-ConfigMulticast* * *PDSCH-Config-MCCH* *pdsch-ConfigMCCH* * *PDSCH-Config-MTCH*  *pdsch-ConfigMTCH* * *fdmed-Reception-Multicast* *fdmed-ReceptionMulticast* * *G-RNTI-Config**MBS-RNTI-SpecificConfig* * *locationAndBandwidth-Multicast*  *locationAndBandwidthMulticast* * *PUCCH-Config-Multicast1* *pucch-ConfigMulticast1* * *PUCCH-Config-Multicast2* *pucch-ConfigMulticast2* * *harq-FeedbackEnabler-Multicast* *harq-FeedbackEnablerMulticast* |
| ASUSTeK[R1-2210095] | Update configrations providing G-RNTI and G-CS-RNTI to either “*G-RNTI-ConfigToAddModList*”/“*G-CS-RNTI-ConfigToAddModList*” respectively or “*MBS-RNTI-SpecificConfig*. |

**CR to TS 38.213:**

|  |  |
| --- | --- |
| CMCC[R1-2209317] | Align the following RRC parameter names in 38.213 with the RRC specification in 38.331:   * *dl-DataToUL-ACK-ForDCI Format4\_1* *dl-DataToUL-ACK-MulticastDCI-Format4-1* * *dl-DataToUL-ACK-MulticastDciFormat4\_1* *dl-DataToUL-ACK-MulticastDCI-Format4-1* * *fdmed-Reception-Multicast* *fdmed-ReceptionMulticast* * *PDCCH-ConfigMulticast* *pdcch-ConfigMulticast* * *cfr-Config-MCCH-MTCH* *cfr-ConfigMCCH-MTCH* * *PDSCH-Config-Multicast* *pdsch-ConfigMulticast*   Delete “or *pdsch-AggregationFactor* in *SPS-Config-Multicast”* in section 9.1.2.  Add “*pucch-ConfigMulticast1/*” to “*pucch-ConfigurationListMulticast1”* and “*pucch-ConfigMulticast2/*” to “*pucch-ConfigurationListMulticast2”* in multicast PUCCH resource configuration related sentences. |

**CR to TS 38.214:**

|  |  |
| --- | --- |
| CMCC[R1-2209318] | Align the following RRC parameter names in 38.214 with the RRC specification in 38.331:   * *pdsch-AggregationFactorMulticast* *pdsch-AggregationFactor* * *pdsch-Config-Multicast* *MBS-RNTI-SpecificConfig* in the description of multicast dynamic scheduling PDSCH repetition number configuration * *PDSCH-ConfigMulticast, PDSCH-Config-Multicast, pdsch-Config-Multicast* *pdsch-ConfigMulticast* in other sections * *pdsch-ConfigPTM* *PDSCH-ConfigPTM* * *PDSCH-Config-MTCH* *pdsch-ConfigMTCH* * *PDSCH-Config-MCCH* *pdsch-ConfigMCCH* * *SPS-Config-Multicast* *SPS-Config* * *CFR-Config-Multicast* *CFR-ConfigMulticast* * *xOverhead-Multicast* *xOverheadMulticast*   Change the second “*PDSCH-Config-MCCH*” to “*pdsch-ConfigMTCH*” in sentence abouth LTE-CRS ratematching pattern configuration for broadcast reception in section 5.4.1.2 |
| ASUSTeK[R1-2210096] | 1. Change configuration providing PDSCH aggregation factor for multicast from “PDSCH-ConfigMulticast” to “g-RNTI-ConfigToAddModList” and remove “Multicast” from” pdsch-AggregationFactorMulticast ”.  2. Align the parameter name for “pdsch-AggregationFactor-r17”, “PDSCH-ConfigMulticast”, “PDSCH-ConfigBroadcast”, ““PDSCH-ConfigMCCH”, ““PDSCH-ConfigMTCH,“PDSCH-ConfigPTM”. |

### 3.11.1 Round-1

***FL’s analysis:***

CMCC provided draft CRs on 38.211, 38.212, 38.213 and 38.214 for RRC parameters alignment in the Rel-17 MBS WI.

ASUSTeK provided one draft CR on 38.212 to correct G-RNTI and G-CS-RNTI configuration parameters and gives two ways, which the second one is aligned with CMCC that change “G-RNTI-Config” to “MBS-RNTI-SpecificConfig”.

ASUSTeK also provided one draft CR on 38.214 which most the changes are included in the CMCC’s CR, except the group-common PDSCH repetition number configuration as the following:

ASUSTeK’s CR:

When receiving PDSCH scheduled by DCI format 4\_1, or 4\_2 in PDCCH with CRC scrambled by G-RNTI, if the UE is configured with *pdsch-AggregationFactor-r17* in the *g-RNTI-ConfigToAddModList* associated withthe corresponding G-RNTI,

CMCC’s CR:

When receiving PDSCH scheduled by DCI format 4\_1, or 4\_2 in PDCCH with CRC scrambled by G-RNTI, if the UE is configured with *pdsch-AggregationFactor* in the *MBS-RNTI-SpecificConfig* associated withthe corresponding G-RNTI

Since we take “MBS-RNTI-SpecificConfig” in TS 38.212 alignment CR, FL suggests use the same RRC parameter name in TS 38.214 as well.

Therefore, FL suggests takes CMCC’s CRs as the baseline for editor alignment CR.

#### Proposal 3.11.1

**For alignment CRs**

* For 38.211:
  + The identified RRC parameter corrections by CMCC in R1-2209315 are referred to the 38.211 editor alignment CR.
* For 38.212:
  + The identified RRC parameter corrections by CMCC in R1-2209316 are referred to the 38.212 editor alignment CR.
* For 38.213:
  + The identified RRC parameter corrections by CMCC in R1-2209317 are referred to the 38.213 editor alignment CR.
* For 38.214:
  + The identified RRC parameter corrections by CMCC in R1-2209318 are referred to the 38.214 editor alignment CR.

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Ok |
| vivo | Fine in general. |
| NTT DOCOMO | OK |
| ZTE | Support |
| Nokia, NSB | OK |
| Ericsson | OK |

## 3.12 Issue#2-15: terms of G-RNTI used for MTCH

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ZTE[R1-2209472] | |  |  | | --- | --- | | ***Reason for change:*** | In the current TS 38.214, RNTI of broadcast service are described by using different terms, such as, G-RNTI for broadcast, G-RNTI for MTCH or broadcast G-RNTI. Actually, all of them are the G-RNTI for MTCH for broadcast. The same term should be used in the specification. | |  |  | | ***Summary of change:*** | Change ‘G-RNTI for broadcast’ or ‘broadcast G-RNTI’ to ‘G-RNTI for MTCH’. | |

### 3.12.1 Round-1

***FL’s analysis:***

One company [ZTE] proposes one editorial CR to use the same term of “G-RNTI for MTCH” in the whole TS 38.214.

#### Proposal 3.12.1

**For alignment CRs**

* For 38.214:
  + The identified corrections on terms of G-RNTI used for MTCH by ZTE in R1-2209472 are referred to the 38.214 editor alignment CR.

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Ok |
| vivo | Fine to use the same term of “G-RNTI for MTCH” in the spec. |
| NTT DOCOMO | OK |
| ZTE | Support |
| Nokia, NSB | OK |
| Ericsson | OK |

## 3.13 Issue#2-16: timeDurationForQCL configuration

|  |  |
| --- | --- |
| LGE[R1-2209449] | ***Proposal 4: For reception of GC-PDSCH scheduled by GC-PDCCH, UE determines whether the time offset between the reception of the DL DCI and the corresponding PDSCH of a serving cell is equal to or greater than a threshold timeDurationForQCL if applicable, as specified in clause 5.1.5 of 38.214, where the threshold is configured per G-RNTI by gNB (based on the worst reported UE capability).***   * ***If the threshold is not configured, the worst value of the threshold in the current specification is used.*** |

### 3.13.1 Round-1

***FL’s analysis:***

One company [LGE] proposes to configure a threshold *timeDurationForQCL* to the UEs in the same MBS group considering different UE reported *timeDurationForQCL* capabilities. In the preparation phase discussion, some companies comment that gNB can ensure that TCI states are consistently configured across UEs, thus, FL suggest we continue to discuss whether this issue is essential or not.

The moderator draft CR is provided based on this CR.

#### Question 3.13.1

**Whether the *timeDurationForQCL* issue from R1-2209449 is essential or not?**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Seems not essential |
| vivo | Not essential.  It is up to gNB to configure the parameter of *timeDurationForQCL.* gNB should make correct configuration. |
| ZTE | This issue can be resolved by the gNB implementation. In any case, the UE with different capability for MBS is common case. We don’t think it is essential. |
| Nokia, NSB | Not essential |
| MTK | Not essential |
| Ericsson | Not essential. |

## 3.14 Issue#2-17: FDM SPS collision handling

|  |  |
| --- | --- |
| vivo[R1-2208620] | If more than one PDSCH on a serving cell each without a corresponding PDCCH transmission are in a slot, after resolving overlapping with symbols in the slot indicated as uplink by *tdd-UL-DL-ConfigurationCommon*, or by *tdd-UL-DL-ConfigurationDedicated*, a UE receives one or more PDSCHs without corresponding PDCCH transmissions in the slot as specified below.  ‒ Step 0: set *j=0*, where *j* is thenumber of selected PDSCH(s) for decoding. *Q* is the set of activated PDSCHs without corresponding PDCCH transmissions within the slot  ‒ Step 1: A UE receives one PDSCH with the lowest configured *sps-ConfigIndex* within *Q*, set *j=j+1*. Designate the received PDSCH as survivor PDSCH.  ‒ Step 2:   * If the UE is only capable of receiving FDMed unicast and multicast PDSCH per slot per carrier and Q includes both unicast SPS PDSCH(s) and multicast SPS PDSCH(s)   + If the survivor PDSCH in step 1 is unicast PDSCH, the UE receives one multicast PDSCH with the lowest configured sps-ConfigIndex within Q (if any), where the multicast PDSCH and the survivor PDSCH in step 1 are FDMed in frequency domain.   + If the survivor PDSCH in step 1 is multicast PDSCH, UE receives one unicast PDSCH with the lowest configured sps-ConfigIndex within Q (if any), where the unicast PDSCH and the survivor PDSCH in step 1 are FDMed in frequency domain .   + The UE stops the pseudo code. * Otherwise, the survivor PDSCH in step 1 and any other PDSCH(s) overlapping (even partially) with the survivor PDSCH in step 1 are excluded from *Q*.   ‒ Step 3: Repeat step 1 and 2 until *Q* is empty or *j* is equal to the number of unicast/multicast PDSCHs in a slot supported by the UE |
| ZTE[R1-2209474] | If more than one PDSCH on a serving cell each without a corresponding PDCCH transmission are in a slot, after resolving overlapping with symbols in the slot indicated as uplink by *tdd-UL-DL-ConfigurationCommon*, or by *tdd-UL-DL-ConfigurationDedicated*, a UE receives one or more PDSCHs without corresponding PDCCH transmissions in the slot as specified below.  If the UE is not capable of receiving FDMed unicast and multicast PDSCH per slot per carrier when the UE receives both PDSCH for unicast or PDSCH for multicast, or the UE only receives the PDSCH for unicast, or the UE only receives the PDSCH for multicast,  ‒ Step 0: set *j=0*, where *j* is thenumber of selected PDSCH(s) for decoding. *Q* is the set of activated PDSCHs without corresponding PDCCH transmissions within the slot  ‒ Step 1: A UE receives one PDSCH with the lowest configured *sps-ConfigIndex* within *Q*, set *j=j+1*. Designate the received PDSCH as survivor PDSCH.  ‒ Step 2: The survivor PDSCH in step 1 and any other PDSCH(s) overlapping (even partially) with the survivor PDSCH in step 1 are excluded from *Q*.  ‒ Step 3: Repeat step 1 and 2 until *Q* is empty or *j* is equal to the number of unicast/multicast PDSCHs in a slot supported by the UE  If the UE is capable of receiving FDMed unicast and multicast PDSCH per slot per carrier.  ‒ The UE resolves collisions among unicast SPS PDSCHs resulting in one unicast SPS PDSCH and collisions among multicast SPS PDSCHs resulting in one multicast SPS PDSCH as step 0 and step 1, respectively.  ‒ If the resulting unicast SPS PDSCH and multicast SPS PDSCH overlap in time but not overlap in frequency, the UE receives both PDSCHs; else, the UE receives the one with lower configured *sps-ConfigIndex*. |
| Ericsson [R1-2210173] | 1. For unicast SPS PDSCH and multicast SPS PDSCH collision handling,  * If a UE only supports TDM unicast SPS PDSCH and multicast SPS PDSCH in a slot, and more than one PDSCH on a serving cell each without a corresponding PDCCH transmission are in a slot, the UE resolves collisions among unicast SPS PDSCHs and multicast SPS PDSCHs by reusing Rel-16 rules. * If a UE only supports FDM unicast SPS PDSCH and multicast SPS PDSCH in a slot, and more than one unicast PDSCH and multicast PDSCH on a serving cell each without a corresponding PDCCH transmission are in a slot,   + 1. the UE resolves collisions among unicast SPS PDSCHs resulting in one unicast SPS PDSCH and collisions among multicast SPS PDSCHs resulting in one multicast SPS PDSCH as in Rel-16, respectively. If the resulting unicast SPS PDSCH and multicast SPS PDSCH overlap in time but not overlap in frequency, the UE receives both PDSCHs; else, the UE receives the one with lower configured sps-ConfigIndex. * If a UE supports both FDM and TDM unicast SPS PDSCH and multicast SPS PDSCH in a slot, and more than one unicast PDSCH and multicast PDSCH on a serving cell each without a corresponding PDCCH transmission are in a slot,   + 1. The UE resolves collisions by receiving the unicast SPS configuration and multicast SPS configuration with the lowest configuration index that do not overlap in both time and frequency. |

### 3.14.1 Round-1

***FL’s analysis:***

In last RAN1 meeting, half of companies commented it as non-essential issue. In the preparation phase in this meeting, companies’ views are still diverged. FL was assuming no change is needed if not supported FDMed unicast SPS and multicast SPS, if companies disagree with this point, then discussion can be conducted focusing on whether specification change is needed if not supported FDMed unicast SPS and multicast SPS

#### Question 3.14.1

**Whether FDMed multicast and unicast SPS collision handling issue is essential or not?**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Non-essential. |
| vivo | We have agreed to support FDMed unicast PDSCH and multicast PDSCH, there is no reason for not supporting FDMed unicast SPS and multicast SPS. There is no difference from the SPS PDSCH receive and decoding perspective. We think FDMed unicast SPS and multicast SPS should be supported. |
| NTT DOCOMO | We don’t think it is essential. Collisions can be avoided by proper scheduling. |
| ZTE | We think this issue is essential. If it is not resolved, the FDM reception for SPS PDSCH cannot be supported for the UE with such capability. |
| Nokia, NSB | Non-essential |
| MTK | Not essential |
| Ericsson | Same view as vivo. |

#### Question 3.14.2

**Whether the specification change is needed if not supported FDMed multicast and unicast SPS?**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | No change needed. |
| MTK | Not needed. |
| Ericsson | We need to revert some of the text in 38.214 clause 5.1 regarding reception of FDM PDSCH for multicast to exclude G-CS-RTNI. |

## 3.15 Issue#2-18: reply LS on MBS SPS configuration on SCell

|  |  |
| --- | --- |
| vivo-Draf LSR-x08581 | **1. Overall Description:**  RAN1 would like to thank RAN2 for sending their agreements and questions in LS R1-2205733 (R2-2206648) on MBS SPS configuration on SCell.  From RAN1 perspective, RAN1 does not see any issue. Two new FGs need to be defined for SPS configuration on SCell. One is to reflect one or multiple (at most 8) SPS group-common PDSCH configuration(s) on SCell. The other one is to reflect the total number of SPS configurations for both multicast and unicast is no larger than 8 per cell, the total number of SPS configurations for both multicast and unicast in a cell group is no larger than 32.  **2. Actions:**  **To RAN2**  **ACTION: RAN1 respectfully ask RAN2 to take above information into account.** |

### 3.15.1 Round-1

***FL’s analysis:***

The LS was guided to be discussed in UE feature session but was not touched due to limited time in the last meeting. FL assesses LS reply is not necessarily needed even though the issue has not been reached in UE feature discussion session.

#### Question 3.15.1

**Whether the LS reply** **to R1-2208581 is needed?**

***Company views:***

|  |  |
| --- | --- |
| Company | Comments |
| Spreadtrum | Not needed. It is being discussed in UE feature session |
| ZTE | Not needed. |

# References

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