**3GPP TSG-RAN WG2 Meeting #118electronic R2-220xxxx**

**Online, May 9th – May 20th, 2022**

**Agenda Item: 6.1.3.2**

**Source: OPPO**

**Title: [AT118-e][031][MBS] MAC (OPPO)**

**Document for: Discussion and decision**

# Introduction

This paper is to trigger the following email discussion of MAC open issues in MBS.

* [AT118-e][031][MBS] MAC (OPPO)

 Scope: Treat R2-2205483, R2-2205129, R2-2205122, R2-2204609, R2-2204833, R2-2205457, R2-2205218, R2-2205437, R2-2205447, R2-2205540, R2-2204667, R2-2204744, R2-2204832, R2-2204969, R2-2205156, R2-2205449, R2-2205035, R2-2205154, R2-2205480, R2-2204831, R2-2204834, R2-2204891, R2-2204904, R2-2204905, R2-2205628, R2-2205629, R2-2205673, R2-2205709, R2-2205713, R2-2205128, R2-2205481, R2-2205748

 Collect one round of comments, pave the way for on-line agreement (identify agreeable points, discussion points),

 Intended outcome: Report

 Deadline: For online CB W1 Friday

**Contact Information**

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# Discussion

## 2.1 Multicast

### 2.1.1 CSI-mask on CSI reporting for multicast

Currently, csi-Mask IE is configured per MAC entity.

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| MAC-CellGroupConfig ::= SEQUENCE {==omit some IEs==== csi-Mask BOOLEAN ==omit some IEs====} |

If the *drx-onDurationTimer* is not running, UE configured with the *csi-Mask* cannot report CSI on PUCCH even if the *drx-onDurationTimerPTM* is running and some companies think it will impact the MBS data secheuling. So they propose that when *allowCSI-SRS-Tx-MulticastDRX-Active* and *csi-Mask* are configured, the UE does not report CSI on PUCCH when both *drx-onDurationTimer* and *drx-onDurationTimerPTM* are not running.

However, some companies have different view based on some reasons, e.g. for the purpose of CSI masking if all MBS DRX on duration are not overlapped, or any multiplexing of individual PUCCH resources linked to MBS DRX would not be possible in time domain alone, or no need to further increase the complexity.

One company think new configuration (i.e. multicast-CSI-mask) to control the CSI report on PUCCH only during the multicast DRX on duration.

**Option 1**: When *allowCSI-SRS-Tx-MulticastDRX-Active* and *csi-Mask* are configured, the UE does not report CSI on PUCCH when both *drx-onDurationTimer* and *drx-onDurationTimerPTM* are not running.

**Option 2**: CSI masking only considers unicast DRX, i.e. excludes MBS DRX (No spec change).

**Option 3**: New configuration (i.e. multicast-CSI-mask) to control the CSI report on PUCCH only during the multicast DRX on duration.

**Q1: Which option do companies prefer?**

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### 2.1.2 DCP on CSI reporting for multicast

RAN2 assumed that DCP monitoring may be configured when multicast DRX is configured. First, RAN2 should confirm whether DCP monitoring can be configured with multicast DRX.

**Q2: Do companies agree DCP monitoring can be configured with multicast DRX?**

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It is common understanding that the DCP monitoring only affects whether *drx-onDurationTimer* is started*,* no impact on the starting of *drx-onDurationTimerPTM*.

Some companies think that to make multicast scheduling efficient, UE should be allowed to report CSI/SRS even the DCP conditions are satisfied if multicast DRX is in Active Time.

However, some companies have different view, e.g. how to reduce the impact of DCP on multicast DRX can be left to gNB implementation.

**Option 1**: If *allowCSI-SRS-Tx-MulticastDRX-Active* is configured, UE can report CSI/SRS even when the conditions for DCP and unicast DRX in TS 38321 are satisfied, if multicast DRX is in Active Time.

**Option 2**: How to reduce the impact of DCP monitoring on multicast DRX can be implemented by gNB without the spec impacts.

**Q3: Which option do companies prefer?**

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Currently, IE *allowCSI-SRS-Tx-MulticastDRX-Active* is configured per MAC entity and one company think it should be configured per MBS DRX to achieve better power efficiency and scheduling flexibility.

**Q4: Do companies agree IE *allowCSI-SRS-Tx-MulticastDRX-Active* is configured per MAC (no spec change), not configured per multicast DRX?**

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### 2.1.3 Others on CSI reporting for multicast

Currently, if UE is configured with both secondary DRX group and *allowCSI-SRS-Tx-MulticastDRX-Active*, and if one DRX group is not in Active Time, only when **all** multicast DRXs are not in Active Time, UE does not report CSI in the DRX group.

Considering dual DRXs are configured and one is for FR1 and another is for FR2, one company propose if *allowCSI-SRS-Tx-MulticastDRX-Active* is configured, UE does not report CSI in a DRX group if unicast DRX and all multicast DRXs of the DRX group are not in Active Time.

**Q5: Do companies agree the below proposal:**

**Proposal: If *allowCSI-SRS-Tx-MulticastDRX-Active* is configured, UE does not report CSI in a DRX group if unicast DRX and all multicast DRXs of the DRX group are not in Active Time.**

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If DRX is not configured for some multicasts, only when all multicast DRXs are not in Active Time, UE does not report CSI in the DRX group. This will prevent the UE from reporting CSI report for the multicast service that is not configured with multicast DRX and affects the scheduling efficiency. One company propose if *allowCSI-SRS-Tx-MulticastDRX-Active* is configured, UE is allowed to report CSI if some of the multicasts are not configured with multicast DRX.

**Q6: Do companies agree the below proposal:**

**Proposal: If *allowCSI-SRS-Tx-MulticastDRX-Active* is configured, UE is allowed to report CSI if some of the multicasts are not configured with multicast DRX.**

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### 2.1.4 Multicast DRX related changes

Due to L1 PTP retransmission for the initial transmission of PTM transmission controlled by DCI, the MAC entity is required to start the corresponding *drx-HARQ-RTT-TimerDL* and *drx-RetransmissionTimerDL* and then stop both *drx-RetransmissionTimerDL* and *drx-RetransmissionTimerDL-PTM*

HARQ process is shared by unicast and multicast and one company propose to stop both *drx-RetransmissionTimerDL* and *drx-RetransmissionTimerDL-PTM* in section 5.7.

The corresponding TP is as follows:

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| When DRX is configured, the MAC entity shall:1> if a MAC PDU is received in a configured downlink assignment:2> start the *drx-HARQ-RTT-TimerDL* for the corresponding HARQ process in the first symbol after the end of the corresponding transmission carrying the DL HARQ feedback;NOTE 1a: If Serving cell is configured with *downlinkHARQ-FeedbackDisabled* and DL HARQ feedback is disabled, *drx-HARQ-RTT-TimerDL* is not started for the corresponding HARQ process.NOTE 1b: If this Serving Cell is part of a non-terrestrial network, the latest UE-gNB RTT value shall be used to set *drx-HARQ-RTT-TimerDL* and *drx-HARQ-RTT-TimerUL* length prior to timer start (see TS 38.331 [5] clause [X]).2> stop the *drx-RetransmissionTimerDL-PTM* for the corresponding HARQ process;2> stop the *drx-RetransmissionTimerDL* for the corresponding HARQ process.**…**1> if a DRX group is in Active Time:2> monitor the PDCCH on the Serving Cells in this DRX group as specified in TS 38.213 [6];2> if the PDCCH indicates a DL transmission; or2> if the PDCCH indicates a one-shot HARQ feedback as specified in clause 9.1.4 of TS 38.213 [6]; or2> if the PDCCH indicates a retransmission of HARQ feedback as specified in clause 9.1.5 of TS 38.213 [6]:3> start or restart the *drx-HARQ-RTT-TimerDL* for the corresponding HARQ process(es) whose HARQ feedback is reported in the first symbol after the end of the corresponding transmission carrying the DL HARQ feedback;NOTE 3: When HARQ feedback is postponed by PDSCH-to-HARQ\_feedback timing indicating an inapplicable k1 value, as specified in TS 38.213 [6], the corresponding transmission opportunity to send the DL HARQ feedback is indicated in a later PDCCH requesting the HARQ-ACK feedback.3> stop the *drx-RetransmissionTimerDL-PTM* for the corresponding HARQ process(es) whose HARQ feedback is reported;3> stop the *drx-RetransmissionTimerDL* for the corresponding HARQ process(es) whose HARQ feedback is reported.3> if the PDSCH-to-HARQ\_feedback timing indicate an inapplicable k1 value as specified in TS 38.213 [6]:4> start the *drx-RetransmissionTimerDL* in the first symbol after the (end of the last) PDSCH transmission (within a bundle) for the corresponding HARQ process. |

**Q7: Do companies agree the below proposal and the above proposed changes?**

**Proposal: Stop both drx-RetransmissionTimerDL and drx-RetransmissionTimerDL-PTM in section 5.7 if multicast DRX is configured.**

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In Nokia paper [R2-2205156], it clarifies in MAC spec section 5.7 that DRX Command MAC CE refers to DRX Command MAC CE with DCI scrambled with C-RNTI or CS-RNTI and configured downlink assignment does not include configured downlink multicast assignment.

**Q8: Do companies agree the changes in section 5.7 proposed in annex of [R2-2205156]?**

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Due to L1 PTP retransmission for the initial transmission of PTM transmission controlled by DCI, the MAC entity is required to start the corresponding *drx-HARQ-RTT-TimerDL* and *drx-RetransmissionTimerDL*. One company proposed that *drx-HARQ-RTT-TimerDL* is only started when the corresponding *HARQ-FeedbackOptionMulticast* is set to *ack-nack* and when DRX is configured.

**Q9: Do companies agree the changes proposed in [R2-2204834]?**

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One company think whether HARQ feedback is enabled has no impact on UE behavior of stopping the retransmission timers after receiving a DL multicast transmission and propose TP in section 5.7b.

**Q10: Do companies agree the changes proposed in [R2-2205481]?**

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## 2.2 Broadcast

### 2.2.1 Broadcast DRX related changes

In [R2-2205218], it proposed to add one note to highlight the timing for DRX duration calculation when SCell is configured for broadcast MBS reception.

NOTE X: If a SCell is configured for MBS broadcast reception, the SFN of this SCell is used to calculate the DRX duration, otherwise the SFN of the SpCell is used.

**Q11: Do companies agree the below proposal and the changes proposed in [R2-2205218]?**

**Proposal: If a SCell is configured for MBS broadcast reception, the SFN of this SCell is used to calculate the DRX duration, otherwise the SFN of the SpCell is used.**

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### 2.2.2 HARQ process related changes for broadcast MBS

There is no NDI and HARQ process id in DCI for broadcast scheduling, there is repetition for MTCH according to the text of beam sweeping of MTCH like OSI. At the same time, RAN1 agree to use *pdsch-AggregationFactor* also for broadcast MBS scheduling.

In [R2-2205437/ R2-2204609/ R2-2204833], companies proposed to add text for HARQ process handling for broadcast MBS reception, but the wordings are different.

Which text do you preferred?

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| Option 1R2-2204609 | For each received TB and associated HARQ information, the HARQ process shall:1> if the NDI, when provided, has been toggled compared to the value of the previous received transmission corresponding to this TB; or1> if the HARQ process is equal to the broadcast process, and this is the first received transmission for the TB according to the system information schedule indicated by RRC; or1> if the HARQ process is associated with a transmission indicated with a MCCH-RNTI or a G-RNTI for MBS broadcast, and this is the first received transmission for the TB according to the MCCH or MTCH schedule indicated by RRC; or |
| Option 2R2-2205437 | For each received TB and associated HARQ information, the HARQ process shall:1> if the NDI, when provided, has been toggled compared to the value of the previous received transmission corresponding to this TB; or1> if the HARQ process is equal to the broadcast process, and this is the first received transmission for the TB according to the system information schedule indicated by RRC; or1. if the HARQ process is associated with a transmission indicated with a MCCH-RNTI or a G-RNTI for MBS broadcast, and this is the first received transmission for the TB according to the scheduling indicated by DCI as specified in TS 38.214 [7]; or
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| Option 3R2-2204833 | For each received TB and associated HARQ information, the HARQ process shall:1> if the NDI, when provided, has been toggled compared to the value of the previous received transmission corresponding to this TB; or1> if the HARQ process is equal to the broadcast process, and this is the first received transmission for the TB according to the system information schedule indicated by RRC; or1> if the HARQ process is allocated for the received TB for MCCH or broadcast MTCH, and this is the first received transmission for the TB according to the scheduling information indicated by RRC; or |

**Q12: Do companies agree the changes and which text do companies prefer in [R2-2205437/ R2-2204609/ R2-2204833]?**

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In [R2-2205437], company proposed MCCH should be readily identified with the MCCH-RNTI and be delivered to upper layers due to no multiplexing for MCCH and proposed the following text:

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| 1> if the data for this TB was successfully decoded before:2> if the HARQ process is equal to the broadcast process; or2> if the HARQ process is associated with a transmission indicated with a MCCH-RNTI:3> deliver the decoded MAC PDU to upper layers.2> else if this is the first successful decoding of the data for this TB:3> deliver the decoded MAC PDU to the disassembly and demultiplexing entity. |

**Q13: Do companies agree the changes above proposed in [R2-2205437]?**

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In [R2-2205457], company proposed to add text to clarify how to select HARQ process for MCCH/MTCH reception.

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| The number of parallel DL HARQ processes per HARQ entity is specified in TS 38.214 [7]. The dedicated broadcast HARQ process is used for BCCH. For MCCH or broadcast MTCH, the UE implementation selects an HARQ process other than the dedicated broadcast HARQ process. |

**Q14: Do companies agree the changes above proposed in [R2-2205457]?**

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### 2.2.3 Other proposed changes

In [R2-2204606], company proposed to capture text for MTCH reception via beam sweeping in 38.321, not in 38.331.

**Q15: Do companies agree the below proposal and agree the corresponding changes proposed in [R2-2204606]?**

**Proposal: Capture text for MTCH reception via beam sweeping in 38.321, not in 38.331.**

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In [R2-2205218], company proposed one note in 5.9 to clarify that the SCell cannot be deactivated by MAC CE if the SCell is configured for broadcast reception.

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| NOTE X: The SCell configured for MBS broadcast reception cannot be deactivated via the SCell Activation/Deactivation MAC CE and Enhanced SCell Activation/Deactivation MAC CE. |

**Q16: Do companies agree the below proposal and the changes proposed in [R2-2205218]?**

**Proposals: The SCell configured for MBS broadcast reception cannot be deactivated via the SCell Activation/Deactivation MAC CE and Enhanced SCell Activation/Deactivation MAC CE.**

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The following changes proposed in [R2-2204833].

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| When the MAC entity needs to read BCCH, the MAC entity may, based on the scheduling information from RRC:1> if a downlink assignment for this PDCCH occasion has been received on the PDCCH for the SI-RNTI;2> indicate a downlink assignment and redundancy version for the dedicated broadcast HARQ process to the HARQ entity.When the MAC entity needs to read MCCH, the MAC entity may, based on the scheduling information from RRC:1> if a downlink assignment for this PDCCH occasion has been received on the PDCCH for the MCCH-RNTI;2> indicate a downlink assignment and redundancy version for the dedicated broadcast HARQ process to the HARQ entity. |

**Q17: Do companies agree the changes proposed in [R2-2204833]?**

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In [R2-2205447], company proposed the text in MAC reset section to excluding broadcast related timer and HARQ process handling. Do you agree the changes?

**Q18: Do companies agree the changes proposed in [R2-2205447]?**

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| Company | Yes/No? | Comments |
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## 2.3 others

In [R2-2205122/ R2-2205129], companies proposed text to clarify discarding unexpected sub PDU for broadcast MBS reception. In previour MAC running CR discussion, most companies agreed to add text in secion 5.3.3, not 5.13. it is better not to open this discussion again, i.e. the yellow highlight text in 5.3.3 below will be kept.

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| 5.3.3 Disassembly and demultiplexingThe MAC entity shall disassemble and demultiplex a MAC PDU as defined in clauses 6.1.2 and 6.1.5a.When a MAC entity receives a MAC PDU for MAC entity's G-RNTI or G-CS-RNTI, or by the configured downlink assignment for MBS multicast containing an LCID or eLCID which is not configured, the MAC entity shall at least:1> discard the received subPDU. |

Due to L1 PTP retransmission for the initial transmission of PTM transmission, the UE may receive a MAC PDU scambmed with C-RNTI or CS-RNTI for retrsnamission of MBS multicast scampbed with G-RNTI or SPS. It is not clear how to handle this case and it is already captured in 5.13 for a error case.

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| 5.13 Handling of unknown, unforeseen and erroneous protocol dataWhen a MAC entity receives a MAC PDU for the MAC entity's C-RNTI or CS-RNTI, or by the configured downlink assignment, containing a Reserved LCID or eLCID value, or an LCID or eLCID value the MAC Entity does not support, the MAC entity shall at least:1> discard the received subPDU and any remaining subPDUs in the MAC PDU.When a MAC entity receives a MAC PDU for the MAC entity's C-RNTI or CS-RNTI, or by the configured downlink assignment, containing an LCID or eLCID value which is not configured, the MAC entity shall at least:1> discard the received subPDU. |

**Option 1**: Due to L1 PTP retransmission for the initial transmission of PTM transmission, when UE receive a MAC PDU scambmed with C-RNTI or CS-RNTI for retrsnamission of MBS multicast scampbed with G-RNTI or SPS, UE discard the unexpected subPDU according to 5.13, i.e. no spec change.

**Option 2**: Due to L1 PTP retransmission for the initial transmission of PTM transmission, when UE receive a MAC PDU scambmed with C-RNTI or CS-RNTI for retrsnamission of MBS multicast scampbed with G-RNTI or SPS, UE discard the unexpected subPDU according to 5.3.3, i.e. add corresponding text for CS-RNTI and C-RNTI case in multicast reception in 5.3.3.

**Q19: Which option do companies prefer and do companies agree the changes proposed in [R2-2205122] if option 2 is chosen?**

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| Company | Yes/No? | Comments |
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In [R2-2205483], company proposed to change the HARQ model for MCCH and broadcast MTCH in Figure 4.2.2-1 and Figure 4.2.2-2.

**Q20: Do companies agree the changes proposed in [R2-2205483]?**

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| Company | Yes/No? | Comments |
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## 2.4 Any other issues?

**Q21: Any other open issues?**

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| Company | Yes/No? | Comments |
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# Conclusions

Based on the discussion above, we propose:

# Reference

General

R2-2205483 Correction on the figures of MAC structure overview Huawei, HiSilicon CR Rel-17 38.321 17.0.0 1272 - F NR\_MBS-Core

R2-2205129 Handling of MAC PDU for MBS with Reserved LCID ASUSTeK discussion Rel-17 38.321 NR\_MBS-Core

R2-2205122 Clarification on MBS MAC subPDU discard LG Electronics Inc., Nokia, Nokia Shanghai Bell draftCR Rel-17 38.321 17.0.0 F NR\_MBS-Core

Broadcast

R2-2204609 38321CR-Corrections on MCCH and MTCH reception OPPO CR Rel-17 38.321 17.0.0 1225 - F NR\_MBS-Core

R2-2204833 Correction on DL Data Transfer for MBS vivo discussion Rel-17 NR\_MBS-Core

R2-2205457 Clarification on the HARQ process used for broadcast MBS Xiaomi Communications draftCR Rel-17 38.321 17.0.0 F NR\_MBS-Core

R2-2205218 [RIL406]The timing for broadcast DRX and SCell deactivation restriction OPPO Beijing CR Rel-17 38.321 17.0.0 1263 - F NR\_MBS-Core

R2-2205437 HARQ Process Handling for MBS Broadcast Samsung R&D Institute India discussion Rel-17 38.321

R2-2205447 MBS Broadcast Retention Samsung R&D Institute India discussion Rel-17 38.321

Multicast

R2-2205540 Remaining MBS user plane open issues Intel Corporation discussion Rel-17 NR\_MBS-Core

R2-2204667 Consideration on MAC Remaining Issues of MBS CATT discussion Rel-17 38.323 NR\_MBS-Core

R2-2204744 Corrections on MBS Spreadtrum Communications discussion Rel-17

R2-2204832 Discussion on the Coexistence of DCP and Multicast DRX vivo discussion Rel-17 NR\_MBS-Core

R2-2204969 Remaining issues on MBS user plane Lenovo discussion Rel-17

R2-2205156 DCP monitoring/WUS and MBS DRX and miscellaneous corrections to DRX Nokia, Nokia Shanghai Bell discussion Rel-17 38.321 NR\_MBS-Core

R2-2205449 WUS and DCP monitoring for MBS Multicast Samsung R&D Institute India discussion Rel-17 38.321

R2-2205035 Discussion on CSI and SRS reporting issues CMCC discussion Rel-17 NR\_MBS-Core

R2-2205154 CSI Mask for MBS Nokia, Nokia Shanghai Bell discussion Rel-17 NR\_MBS-Core

R2-2205480 Remaining issues on CSI reporting for multicast Huawei, HiSilicon discussion Rel-17 NR\_MBS-Core

R2-2204831 Discussion on CSI-mask Configuration with Multicast DRX vivo discussion Rel-17 NR\_MBS-Core

R2-2204834 Correction on Multicast DRX vivo discussion Rel-17 NR\_MBS-Core

R2-2204891 Discussion on the impact of CSI and SRS due to multicast DRX NEC Europe Ltd discussion Rel-17 NR\_MBS-Core

R2-2204904 The timing for broadcast DRX and editorial corrections for multicast DRX OPPO CR Rel-17 38.321 17.0.0 1241 - F NR\_MBS-Core

R2-2204905 Corrections on CSI-mask and DCP coexistence for multicast DRX MediaTek inc. discussion Rel-17 NR\_MBS-Core

R2-2205628 CSI and SRS reporting in MBS DRX ZTE, Sanechips discussion Rel-17 NR\_MBS-Core

R2-2205629 Correction on CSI and SRS reporting for multicast DRX to 38321 ZTE, Sanechips CR Rel-17 38.321 17.0.0 1276 - F NR\_MBS-Core

R2-2205673 Leftover issues on multicast DRX mechanism Apple discussion Rel-17 NR\_MBS-Core

R2-2205709 Discussion on CSI reporting due to multicast DRX LG Electronics Inc. discussion Rel-17 NR\_MBS-Core

R2-2205713 Remaining Issues on Multicast DRX Samsung discussion Rel-17 NR\_MBS-Core

R2-2205128 Discussion on unicast retransmission for MBS transmission ASUSTeK discussion Rel-17 38.321 NR\_MBS-Core

R2-2205481 Clarification on DRX timers for multicast Huawei, HiSilicon discussion Rel-17 NR\_MBS-Core

R2-2205748 Multicast and CSI, SRS and DCP Ericsson discussion Rel-17 NR\_MBS-Core