3GPP TSG-RAN WG2 Meeting #119bis-e R2-22xxxxx

Online, October 10 – October 19, 2022

**Agenda item: 6.1.4**

**Source: Samsung**

**Title: Report of Offline 603: UP Correction for Rel-17 MBS**

**Document for: Report**

# Introduction

This document is a summary of the following offline discussion.

* [AT119bis-e][603][MBS-R17] UP corrections (Samsung)

 Scope: Treat [R2-2210051](file:///C%3A%5CUsers%5CDwx974486%5CDocuments%5C3GPP%5CExtracts%5CR2-2210051%20Miscellaneous%20corrections%20for%20MBS%2038.323.docx) and remaining issues from documents in 6.1.4.

 Outcome: Report (Samsung) + CR(s) as needed:

* 38.323: Xiaomi
* 38.321: OPPO

 Deadline: Report available: Tuesday 2022-10-18 1000 UTC, agreeable CR(s): EOM

This offline discussion covers remaining issues in user plane.

# Contact Information

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# Discussion

## Issue #1: PDCP Rapporteur CR

The PDCP rapporteur CR (R2-2210551) proposed to correct the RRC field name to align with the RRC spec, as follows:

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| For multicast MRBs, the initial value of RX\_DELIV is set by *initialRX-DELIV* in TS 38.331 [3]. |

**Q1. Do companies agree the change of R2-2210551?**

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| **Company** | **Yes/No** | **Comment** |
| LGE | Yes |  |
| ASUSTeK | Yes |  |
| Lenovo | Yes |  |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Google | Yes |  |
| Samsung | Yes |  |
| OPPO | Yes  |  |
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## Issue #2: Clarification on CSI-Masking

For unicast DRX, consideration for running of *drx-onDurationTimer* of a DRX group includes “grants/assignments scheduled on Serving Cell(s)”. It is because of the case of transition between long DRX and short DRX due to the grant/assignment discussed during LTE Rel-11. Multicast DRX does not have short DRX, so Samsung (R2-2209438) proposed to remove this part for Multicast DRX, as follows:

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| 2> if CSI masking (*csi-Mask*) is setup by upper layers:3> in current symbol n, if *drx-onDurationTimer* of a DRX group would not be running considering grants/assignments scheduled on Serving Cell(s) in this DRX group and DRX Command MAC CE/Long DRX Command MAC CE received until 4 ms prior to symbol n when evaluating all DRX Active Time conditions as specified in this clause; and3> if *allowCSI-SRS-Tx-MulticastDRX-Active* is not configured or, in current symbol n, if *drx-onDurationTimerPTM(s)* of all multicast DRXes corresponding to the DRX group would not be running considering DRX Command MAC CE for MBS multicast received until 4 ms prior to symbol n when evaluating all DRX Active Time conditions as specified in Clause 5.7b and all multicast sessions corresponding to the DRX group are configured with multicast DRX:4> not report CSI on PUCCH in this DRX group. |

**Q2. Do companies agree to remove “multicast assignments” as running condition of *drx-onDurationTimerPTM?***

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| **Company** | **Yes/No** | **Comment** |
| LGE | Yes | Agree to Samsung’s analysis. |
| ASUSTeK | Yes |  |
| Lenovo | Yes |  |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Google | Yes |  |
| Samsung | Yes |  |
| OPPO | Yes  |  |
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## Issue #3: HARQ RTT Timer Start Condition

### Pre-condition of RTT timer start and retransmission timer stop

Huawei/CBN/HiSilicon (R2-2209656) pointed out that the pre-condition of the start of *drx-HARQ-RTT-TimerDL* and the stop of *drx-RetransmissionTimerDL* in multicast DRX, i.e. *“When multicast DRX is configured for a G-RNTI or G-CS-RNTI”* is incorrect. The problematic case is that only the unicast DRX is configured. The current text does not allow to start *drx-HARQ-RTT-TimerDL* upon multicast assignment and stop *drx-RetransmissionTimerDL* for unicast DRX. For this case, the proponent companies proposed to add a condition and a note to clarify as follows:

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| 5.7b Discontinuous Reception (DRX) for MBS Multicast\*\*\*\*\*Text omitted\*\*\*\*\*When multicast DRX is configured for a G-RNTI or G-CS-RNTI or when unicast DRX is configured, the MAC entity shall for this G-RNTI or G-CS-RNTI:NOTE 0: The operations related to unicast DRX timers are performed only if unicast DRX is configured, and the operations related to multicast DRX timers are performed only if multicast DRX is configured.1> if a MAC PDU is received in a configured downlink multicast assignment:2> if HARQ feedback is enabled:3> start the *drx-HARQ-RTT-TimerDL-PTM* for the corresponding HARQ process in the first symbol after the end of the corresponding transmission carrying the DL HARQ feedback;3> 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.2> stop the *drx-RetransmissionTimerDL-PTM* for the corresponding HARQ process;2> stop the *drx-RetransmissionTimerDL* for the corresponding HARQ process. |

**Q3-1a. Do companies agree to clarify that the behaviour of unicast DRX timers doesn’t depend on the configuration of multicast DRX, i.e. start of *drx-HARQ-RTT-TimerDL* and the stop of *drx-RetransmissionTimerDL?* (TP above is a baseline.)**

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| **Company** | **Yes/No** | **Comment** |
| LGE | No | If unicast DRX is not configured, there is no unicast DRX timers. Then, UE does not start/stop the unicast DRX RTT timers. Therefore, such change is not needed.But, if clarification is really required, we prefer a simple one as follows:…3> start the *drx-HARQ-RTT-TimerDL,* if configured, for the corresponding HARQ process in the first symbol after the end of the corresponding transmission carrying the DL HARQ feedback.…2> stop the *drx-RetransmissionTimerDL,* if configured, for the corresponding HARQ process.… |
| ASUSTeK | Yes | Either a NOTE or LG’s TP is fine. “or when unicast DRX is configured” seems not necessary. |
| Lenovo | Yes | Some clarifications seem needed. Both Huawei and LGE’s proposal are fine to us. |
| CATT | Agree with the intention | LG’s TP also make sense. |
| Huawei, HiSilicon | Yes | Proponent.The key issue here is that if we don’t add “or when unicast DRX is configured” in the precondition, the following case will happen: Assuming multicast DRX is not configured but unicast DRX is configured, there will be no starting *drx-HARQ-RTT-TimerDL* and no stopping the *drx-RetransmissionTimerDL,* due to the precondition of “When multicast DRX is configured”. This is incorrect as when multicast assignment is received and UE is expecting PTM retransmission via C-RNTI, it should start *drx-HARQ-RTT-TimerDL*. This unicast DRX timer shouldn’t depend on the configuration of multicast DRX. LG’s TP doesn’t solve this issue as the original precondition doesn’t allow UE to go into the subsequent procedural steps if multicast DRX is not configured. |
| Google | Yes |  |
| Samsung | Yes but the note is not necessary | If only the unicast DRX timer is configured, upon multicast assignment, drx-HARQ-RTT-TimerDL is not started and drx-RetransmissionTimerDL is not stopped. To resolve the issue, the pre-condition “or when unicast DRX is configured” is needed. However, the proposed NOTE is not necessary, since the normative procedure should be corrected. |
| OPPO | Yes  | LG wording is better. But I wonder whether “if configured” is missing everywhere in MAC spec? |
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For unicast DRX, there is a same issue on the pre-condition for stop of *drx-RetransmissionTimerDL-PTM:* When DRX is configured. Similar to Multicast DRX, the proponent companies proposed to add a condition and a note to clarify as follows:

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| 5.7 Discontinuous Reception (DRX)\*\*\*\*\*Text omitted\*\*\*\*\*When DRX is configured or when multicast DRX is configured, the MAC entity shall:NOTE 0: The operations related to unicast DRX timers are performed only if unicast DRX is configured, and the operations related to multicast DRX timers are performed only if multicast DRX is configured.1> if a MAC PDU is received in a configured downlink assignment for unicast:\*\*\*\*\*Text omitted\*\*\*\*\*2> stop the *drx-RetransmissionTimerDL* for the corresponding HARQ process;2> stop the *drx-RetransmissionTimerDL-PTM* for the corresponding HARQ process.\*\*\*\*\*Text omitted\*\*\*\*\* |

**Q3-1b. Do companies agree to clarify that the behaviour of multicast DRX timers doesn’t depend on the configuration of unicast DRX, i.e. the stop of *drx-RetransmissionTimerDL-PTM?* (TP above is a baseline.)**

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| **Company** | **Yes/No** | **Comment** |
| LGE | No | If multicast DRX is not configured, there is no multicast DRX timers. Then, UE does not start/stop the multicast DRX RTT timers. Therefore, such change is not needed.But, if clarification is really required, we prefer a simple one as follows:2> stop the *drx-RetransmissionTimerDL-PTM,* if configured, for the corresponding HARQ process. |
| ASUSTeK | Yes | Either a NOTE or LG’s TP is fine.“or when multicast DRX is configured” seems not necessary. |
| Lenovo | Yes | Some clarifications seem needed. Both Huawei and LGE’s proposal are fine to us. |
| CATT | Agree with the intention | LG’s TP also make sense. |
| Huawei, HiSilicon | Yes | Similar as our reply to **Q3-1a.** |
| Google | Yes |  |
| Samsung | Yes but the note is not necessary | Same as Q3-1aIf only the multicast DRX timer is configured, upon unicast assignment, drx-RetransmissionTimerDL-PTM is not stopped. Thus, it should be corrected. But the proposed NOTE is not necessary. |
| OPPO | Yes  | Same comments as above. |
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### *drx-HARQ-RTT-TimerDL* Start in case UE does not support PTP retransmission

In the current MAC specification, when a UE receives a PTM transmission, the unicast DRX timer *drx-HARQ-RTT-TimerDL* is always started. Even if the UE does not support PTP retransmission based on 33-2d (PTP retransmission for multicast dynamic scheduling) and 33-5-1d (PTP retransmission for SPS group-common PDSCH for multicast), *drx-HARQ-RTT-TimerDL* is started. Huawei/CBN/HiSilicon (R2-2209656) pointed out that *drx-HARQ-RTT-TimerDL* does not need to be started at least for UE not supporting PTP retransmission via C-RNTI for a PTM transmission. The proponent companies proposed to clarify this case.

**Q3-2. Do companies agree to clarify the UE doesn’t need to start *drx-HARQ-RTT-TimerDL* after receiving a PTM transmission if the UE does not support PTP retransmission via C-RNTI for the initial PTM transmission?**

**- Yes: Clarify this (FFS: Detail)**

**- No change: Always start *drx-HARQ-RTT-TimerDL*. It may waste UE power consumption but may be considered as an optimization.**

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| **Company** | **Yes/No** | **Comment** |
| LGE | No | It seems an optimization. |
| ASUSTeK | Yes | It does not make sense to always start drx-HARQ-RTT-TimerDL and waste UE power for nothing if PTP retransmission for PTM transmission is not possible.We think it’s not an optimization since it has been agreed in RAN2 that RTT Timer is only started when expected.In PTP for PTM retransmission, the UE monitors UE specific PDCCH/C-RNTI only during unicast DRX’s active time. Unicast DRX’s RTT timer can be started when PTP retransmission is **expected**.Besides, t’s also clear in RAN1 spec 38.213 that PTP retransmission is supported only if the first HARQ-ACK reporting mode is configured.“For the first HARQ-ACK reporting mode, a PDSCH reception providing **a retransmission** of the transport block can be scheduled either by a multicast DCI format using a same G-RNTI as the G-RNTI of the initial transmission of the transport block, or by a **unicast DCI format using a C-RNTI** [6, TS 38.214].” |
| Lenovo | Yes | It would be better to clarify the UE’s behaviour. Always starting drx-HARQ-RTT-TimerDL is not an optimal solution. |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes  | Proponent.During RAN2#116bis e-meeting, we made the following agreement:**In PTP for PTM retransmission, the UE monitors UE specific PDCCH/C-RNTI only during unicast DRX’s active time. Unicast DRX’s RTT timer can be started when PTP retransmission is expected.**But it was not captured in the current MAC specs as RAN1 didn’t make it an optional capability at that time. Given that RAN1 has already defined them as two optional capabilities: 33-2d (PTP retransmission for multicast dynamic scheduling) and 33-5-1d (PTP retransmission for SPS group-common PDSCH for multicast), this should be captured. |
| Google | Yes |  |
| Samsung | No | Despite the power inefficiency, nothing is broken. We are ok to leave it as it is. |
| OPPO | No strong view | I don not understand why UE does not support PTP? Anyway, the UE will receive data via C-RNTI without any capability. What is the issue to support PTP? |
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## Issue #4: Correction on DRX Command MAC CE

In the MAC specification, “DCI scrambled with C-RNTI” and “DCI scrambled with a G-RNTI” are used to identify the DRX Command MAC CEs for Unicast DRX and Multicast DRX, respectively. LG (R2-2210592) and Google (R2-2210684) pointed out that it is a physical layer operation which has not been specified by MAC and even PHY specification doe not use this condition. The propoenent companies proposed to use “PDCCH addressed to C-RNTI/G-RNTI” to align with other texts in the MAC specification.

**Q4-1. Do companies agree to modify the text “DCI scrambled with C-RNTI/G-RNTI”?**

**- Option 1: Yes, LG’s TP is preferred (R2-2210592).**

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| if a DRX Command MAC CE is received by PDCCH addressed to C-RNTI for unicast transmissionif a DRX Command MAC CE is received by PDCCH addressed to a G-RNTI |

**- Option 2: Yes, Google’s TP is preferred (R2-2210684).**

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| if a DRX Command MAC CE with PDCCH addressed to the C-RNTI for unicast transmission is receivedif a DRX Command MAC CE with PDCCH addressed to a G-RNTI is received |

**- Option 3: No change**

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| **Company** | **Option** | **Comment** |
| LGE | Option 1 |  |
| ASUSTeK | Option 1(See Comment) | If we agree to have a NOTE in Q4-2 to clarify unicast and multicast, the TP in Option 1 can be shorter as below.“if a DRX Command MAC CE is received for unicast transmission” |
| Lenovo |  | Both Option 1 and option 2 are fine.  |
| CATT |  | Another possible modification can be:if a DRX Command MAC CE ~~with DCI scrambled with C-RNTI~~ for unicast transmission is received on the PDCCH for C-RNTI.if a DRX Command MAC CE ~~with DCI scrambled with a G-RNTI~~ is received on the PDCCH for a G-RNTI |
| Huawei, HiSilicon | Option 1 | More clear than option 2. |
| Google | Option 1 or 2 | Proponent of option 2. We are also fine with option 1. |
| Samsung | Option 1 or Option 2 | No strong view among Options 1 and 2 |
| OPPO | No strong view, option 1 is better. |  |
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When ‘a DRX Command MAC CE with DCI scrambled with C-RNTI for unicast transmission’ is received, the intended behaviour is to apply the MAC CE to unicast DRX cycle only if the MAC PDU containing the MAC CE does not contain a MAC SDU intended for MTCH logical channel. However, there is no clear definition of unicast transmission. If unicast transmission is misinterpreted as a transmission only to the UE configured with the C-RNTI, the UE can apply the MAC CE to unicast DRX even if the MAC PDU containing the MAC CE contains a MAC SDU intended for MTCH logical channel. LG (R2-2210592) proposed to add a note to clarify this.

**Q4-2. Do companies agree to add the following note in TS 38.321?**

NOTE x : The unicast transmission does not contain a MAC SDU for MTCH logical channel.

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| **Company** | **Yes/No** | **Comment** |
| LGE | Yes |  |
| ASUSTeK |  | Not strong opinion. If we have some CR for MBS, it’s ok to add this clarification. |
| Lenovo | Yes | The clarification seems fine |
| CATT | No | We think it is not necessary and can be handled by the NW. |
| Huawei, HiSilicon | No | From our perspective, there is no such misunderstanding. |
| Google | No | “unicast transmission” is clear so nothing is needed. |
| Samsung | No | It’s up to the network. We do not need to specify NW behaviour. |
| OPPO | No  |  |
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## Issue #5: (De-)multiplexing block for MCCH in TS 38.300

The MAC specification clarified that (de-)multiplexing function is supported for MCCH. However, this has not been simultaneously captured in the Stage-2 specification. vivo (R2-2209416) proposed to incorporate (de-)multiplexing block for MCCH in TS 38.300 as follows:

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| **Figure 16.10.3-2: Downlink Layer 2 Architecture for Broadcast Session** |

**Q5. Do companies agree to modify Figure 16.10.3-2 in TS 38.300 to add the (de-)multiplexing block?**

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| **Company** | **Yes/No** | **Comment** |
| LGE | Yes |  |
| ASUSTeK | Yes |  |
| Lenovo | Yes |  |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Google | Yes |  |
| Samsung | Yes | Fine to add the multiplexing block |
| OPPO | Yes  |  |
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## Issue #6: HARQ Buffer Flush at MAC Reset

During the online session on Monday, RAN2 agreed to clarify MAC Reset operation not to treat broadcast bundle as a new transmission as follows:

* Do not remove the exception for MBS for flushing soft buffers.
* Clarify that the transmission after MAC reset should not (always) be treated as a new transmission for MBS broadcast soft buffer. E.g. add “except for MBS broadcast” for the relevant bullet.
* DL HARQ buffers (soft buffers) are not flushed due to TAT expiry. No change needed for HARQ buffers flushing due to TAT expiry.

The rapporteur would suggest to have the same condition with the case of buffer flushing.

**Q6. Do companies agree to add the following condition which excludes HP being used for broadcast?**

If a reset of the MAC entity is requested by upper layers or the reset of the MAC entity is triggered due to SCG deactivation as defined in clause 5.29, the MAC entity shall:

…

1> flush the soft buffers for all DL HARQ processes, except for the DL HARQ process being used for MBS broadcast;

1> for each DL HARQ process, except for the DL HARQ process being used for MBS broadcast, consider the next received transmission for a TB as the very first transmission;

**- Yes**

**- No (Please provide alternative wording)**

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| **Company** | **Yes/No** | **Comment**  |
| LGE | Yes | We can accept it. It is aligned with the intention of ‘not flushing DL soft buffers for MBS broadcast’. |
| ASUSTeK | Yes |  |
| Lenovo | Yes |  |
| CATT | Yes | We can accept it to align with UE behaviour on flushing soft buffers for DL HARQ processes. |
| Huawei, HiSilicon | Yes |  |
| Google | Yes |  |
| Samsung | Yes | Similar text to soft buffer flushing is preferred. |
| OPPO | Yes  |  |
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## Issue #7: MRB Type Determination by Target Configuration

During the online session on Monday, RAN2 made the following agreements on MRB type change.

* We keep the principle of UM MRB and AM MRB in PDCP specs (no change to PDCP specs).
* For PDCP procedures, MRB type is determined by the target/latest/received configuration when the RLC entity associated to the PDCP entity is changed between UM and AM. (capture as a NOTE at least in PDCP specs, the exact wording discussed as part of CR update, can consider adding a NOTE in RRC specs as well).

This offline discussion should focus on how to capture the agreement in the specification. As captured in the agreement, a note in PDCP will be added and the final wording will be discussed during the CR phase. The issue here is whether a similar note is needed in the RRC specification.

**Q7. Do companies agree to have a note in RRC specification?**

e.g. NOTE x: At PDCP re-establishment, the MRB type (i.e. UM MRB or AM MRB) is determined by the target configuration.‎

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| **Company** | **Yes/No** | **Comment** |
| LGE | Yes |  |
| ASUSTeK | Yes |  |
| Lenovo | Yes |  |
| CATT | No | NOTE in PDCP spec is sufficient |
| Huawei, HiSilicon | Yes |  |
| Google | Yes |  |
| Samsung | No | We think change in PDCP is enough. In RRC, the UE only uses the recently received configuration. |
| OPPO | No  | It is enough to add note in PDCP sepc. |
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## Issue #8: PDCP State Variable Handling

During the online discussion on Monday, RAN2 made the following agreement on PDCP state variable handling:

* Do not reset RX\_NEXT and RX\_DELIV to the initial value when MRB PDCP is suspended unless a serious issue is found.
* Continue offline with other proposals

The agreements were based on Nokia’s contribution (R2-2209551) having the following proposals:

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| **Proposal 1:** Do not reset TX\_NEXT, RX\_NEXT and RX\_DELIV to the initial value when MRB PDCP is suspended.**Proposal 2:** Continue PDCP COUNT when a deactivated MBS multicast session is activated.**Proposal 3:** There is no need for configuration of initial value of RX\_DELIV when PDCP is re-established for AM MRB. |

For PDCP suspend, the issue seems to have been resolved by not resetting the variable. One thing to check is if there is any serious issue.

**Q8-1. Do companies have any serious issue that makes the procedure not work if RX\_NEXT and RX\_DELIV are not reset at PDCP Suspend?**

**- Yes (please explain the serious issue)**

**- No issue**

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| **Company** | **Yes/No** | **Comment** |
| LGE | No |  |
| ASUSTeK | No |  |
| Lenovo | No |  |
| CATT | No |  |
| Huawei, HiSilicon | No | We don’t see any big issue here. |
| Google | No |  |
| Samsung | No | The agreement is a working solution.  |
| OPPO | No  |  |
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Now the remaining issue is for PDCP Re-establishment of AM MRB. During the online discussion, Proposal 3 of R2-2209551 was almost agreeable but not officially agreed due to the lack of time. The rapporteur would like to quickly check if we can directly agree it.

**Q8-2. Do companies agree the following proposal? (Note that P3 requires no specification change)**

Proposal 3: There is no need for configuration of initial value of RX\_DELIV when PDCP is re-established for AM MRB.

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| LGE | Yes |  |
| ASUSTeK | Yes |  |
| Lenovo | Yes |  |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes | Current specs are fine (both 331 and 323). If we add this configuration for AM MRB, the PDCP behaviour needs to be changed during AM PDCP re-establishment, i.e. the UE needs to decide whether to initialize the PDCP parameters according to the configuration.TS 38323:*When upper layers request a PDCP entity re-establishment, the receiving PDCP entity shall:* *……**- for SRBs, UM DRBs and UM MRBs, set RX\_NEXT and RX\_DELIV to the initial value;**……* |
| Google | Yes |  |
| Samsung | Yes |  |
| OPPO | Yes  |  |
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For Proposal 2 of R2-2209551, many companies thought that it is up to NW configuration if P3 is agreed, since MRB release and add is already supported. Thus, the rapporteur would like to ask companies’ view on whether additional specification impact is expected.

**Q8-3. Do companies agree that the following proposal has no specification impact assuming that P3 of R2-2209551 is agreed?**

**Proposal 2:** NW may configure to continue PDCP COUNT when a deactivated MBS multicast session is activated. (no specification impact)

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment (please explain the required spec change if your answer is “no”)** |
| LGE | Yes |  |
| ASUSTeK | Yes | It’s also ok for us to capture this understanding in spec or meeting minutes. |
| Lenovo | Yes | Network can keep the MBS context we the session is deactivated. |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes | No specification impact |
| Google | Yes |  |
| Samsung | Yes |  |
| OPPO | Yes  |  |
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# Conclusion