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:\Users\Dwx974486\Documents\3GPP\Extracts\R2-2210051%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.

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# Discussion

## Issue #1: PDCP Rapporteur CR

The PDCP rapporteur CR (R2-2210051) 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 R2-2210051?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| LGE | Yes |  |
| ASUSTeK | Yes |  |
| Lenovo | Yes |  |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Google | Yes |  |
| Samsung | Yes |  |
| MediaTek | Yes |  |
| OPPO | Yes |  |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| Intel | Yes |  |
| Qualcomm | - | This should be Cat D, unless anything else needs to be added. Strictly editorial error like this can also be handled by MCC directly.  [Rapp] This is a baseline rapporteur CR which will incorporate other changes. Then this CR can be Cat-F. |
| Apple | Yes |  |
| vivo | Yes |  |
| ZTE | Yes |  |
| Sharp | Yes |  |
| Xiaomi | Yes |  |
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< Summary >

All companies agreed the change.

**Proposal 1 (all): Editorial change of R2-2210051 is agreed.**

## 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; and  3> 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 |  |
| MediaTek | Yes |  |
| OPPO | Yes |  |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| Intel | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| Sharp | Yes |  |
| Xiaomi | Yes |  |
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< Summary >

All companies agreed the change.

**Proposal 2 (all): “multicast assignments” is removed from the running condition of *drx-onDurationTimerPTM* (as proposed by R2-2209438).**

## 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.  …  LGE2: After the rapporteur’s further clarification on the issue #3, we put a new answer below. Please refer to LGE2’s answer. |
| 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. |
| MediaTek | Yes | We are fine with the note by Huawei |
| OPPO | Yes | LG wording is better. But I wonder whether “if configured” is missing everywhere in MAC spec?  [Rapp] MAC spec has some place where “if configured” is not specified. But my understanding is that the timer operation can be performed only if it is configured. |
| LGE2 | Yes but the note is not necessary | Agree with Samsung. |
| Nokia | Partly yes | The problematic case here is when multicast DRX is not configured but unicast DRX is configured.  The additional condition “or when unicast DRX is configured” is needed but it is not enough: the second stopping of the drx-RetransmissionTimerDL never happens since it is behind a condition “*1> if the MAC entity is in Active Time for this G-RNTI or G-CS-RNTI*”. If multicast DRX is not configured, this condition is not true.  Regarding the note we agree with LGE that it is not needed. |
| Ericsson | Yes, comment | The addition “or when unicast DRX is configured” is fine. Note is not needed. |
| Intel | Yes |  |
| Qualcomm | Partly. See comments | Just adding “or when unicast DRX is configured” also triggers timer operations for -PTM, such as “stop the drx-RetransmissionTimerDL-PTM for the corresponding HARQ process”, even though multicast DRX is not configured and therefore this timer was never started.  [Rapp] I think that’s the intention. When the multicast DRX is not configured, –PTM timer is not configured so –PTM timer will not be started.  The Notes are helpful to make sure the timer operations in unicast and multicast DRX are performed only when the corresponding DRX is configured. But preferable if they are clarified further in normative text. |
| Apple | Yes |  |
| vivo | Yes | Same view as LG and Samsung. The current spec works well and we fail to see the motivation to capture this new note. |
| ZTE |  | agree with Nokia |
| Sharp | Yes | We are fine with the note. |
| Xiaomi | Yes |  |
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< Summary >

All companies agreed the problem and the intention, but companies have slightly different views how to resolve the issue.

- The additional condition is enough: 12 companies (LG, Lenovo, Huawei, Google, Samsung, Ericsson, Intel, Qualcomm, Apple, vivo, ZTE, Xiaomi)

- The additional condition is not enough (still has a problem): 2 companies (Nokia, ZTE)

- Fine with Note: 7 companies (ASUSTeK, Lenovo, CATT, MediaTek, OPPO, Qualcom, Sharp)

Among 18 companies, 12 companies were fine with adding condition. Also, the rapporteur agrees with Nokia’s comment that another condition “*1> if the MAC entity is in Active Time for this G-RNTI or G-CS-RNTI*” blocks the intended behaviour. To resolve the problem, the rapporteur would like to suggest additional normative change based on Huawei’s original text and Nokia’s comment, as follows:

**Proposal 3-1: Conditions “or when unicast DRX is configured” and “if multicast DRX is not configured unicast DRX is configured” are added in subclause 5.7b to start and stop –PTM timers.**

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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:  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.  1> if a *drx-HARQ-RTT-TimerDL-PTM* expires:  2> if the data of the corresponding HARQ process was not successfully decoded:  3> start the *drx-RetransmissionTimerDL-PTM* for the corresponding HARQ process in the first symbol after the expiry of *drx-HARQ-RTT-TimerDL-PTM*.  1> if a DRX Command MAC CE with DCI scrambled with a G-RNTI is received:  2> stop *drx-onDurationTimerPTM* of the DRX for this G-RNTI;  2> stop *drx-InactivityTimerPTM* of the DRX for this G-RNTI.  1> if [(SFN × 10) + subframe number] modulo (*drx-LongCycle-PTM*) = *drx-StartOffset-PTM*:  2> start *drx-onDurationTimerPTM* after *drx-SlotOffsetPTM* from the beginning of the subframe.  1> if the MAC entity is in Active Time for this G-RNTI or G-CS-RNTI; or  1> if multicast DRX is not configured and unicast DRX is configured:  2> monitor the PDCCH for this G-RNTI or G-CS-RNTI as specified in TS 38.213 [6];  2> if the PDCCH indicates a DL multicast transmission:  3> if HARQ feedback is enabled:  4> 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;  4> 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.  3> stop the *drx-RetransmissionTimerDL-PTM* for the corresponding HARQ process;  3> stop the *drx-RetransmissionTimerDL* for the corresponding HARQ process.  \*\*\*\*\*Text omitted\*\*\*\*\* |

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.  LGE2: After the rapporteur’s further clarification on the issue #3, we put a new answer below. Please refer to LGE2’s answer. |
| 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 Q3-1a  If 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. |
| MediaTek |  | We can simply add a note below the **stop of *drx-RetransmissionTimerDL-PTM:***  The operations related to multicast DRX timers are performed only if multicast DRX is configured.  And other corrections are not needed. |
| OPPO | Yes | LG wording is better. But I wonder whether “if configured” is missing everywhere in MAC spec? |
| LGE2 | Yes but the note is not necessary | Agree with Samsung. |
| Nokia | ? | It should be discussed whether the condition “When DRX is configured” already covers also multicast DRX. The additional condition “or when multicast DRX is configured” may not be needed. The problematic case here is when unicast DRX is not configured but multicast DRX is configured. The question is whether section 5.7 is executed in that case. We assume it is.  [Rapp] “DRX is configured” is a legacy text, so my understanding is it’s unicast DRX.  However, the proposed solution is not enough, the problem remains: drx-RetransmissionTimerDL-PTM is not stopped always since the other stopping is behind another condition: “if a DRX group is in Active Time” This condition is not true if unicast DRX is not configured.  Regarding the note we agree with LGE that it is not needed. |
| Ericsson | Yes, comment | See Q3-1a input. |
| Intel | Yes |  |
| Qualcomm | ? | Similar to Nokia’s comment: first we should decide whether this section already applies for multicast DRX.  Also similar to the response in previous question: here also the issue seems to be there of stopping the -PTM timers which were never started (unicast DRX enabled but multicast DRX not), or unicast timers stopped which were not started (case of only multicast DRX enabled).  It should be clear that the multicast DRX timers are not impacted if multicast DRX is not even configured. Also, unicast timers should not be impacted if unicast DRX is not enabled and the UE does not support PTP retx for multicast (as discussed in Q3-2). |
| Apple | Yes |  |
| vivo | Yes | Same view as LG and Samsung. The current spec works well and we fail to see the motivation to capture this new note. |
| ZTE |  | we tend to think the DRX in “When DRX is configured” is only for legacy DRX. therefore an additional condition for multicast DRX might be needed anyway. |
| Sharp | Yes |  |
| Xiaomi | Tes | We share the same view with LG and Samsung. |
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< Summary >

Companies’ view is aligned with Q3-1. Thus, the rapporteur would like to suggest the similar proposals:

**Proposal 3-2: Conditions “or when multicast DRX is configured” and “if DRX is not configured and multicast DRX is configured” are added in subclause 5.7 to start and stop unicast timers.**

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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:  1> if a MAC PDU is received in a configured downlink assignment for unicast:  2> if this Serving Cell is configured with *downlinkHARQ-FeedbackDisabled*:  3> if the corresponding HARQ process is configured with HARQ feedback enabled:  4> set *HARQ-RTT-TimerDL-NTN* for the corresponding HARQ process equal to *drx-HARQ-RTT-TimerDL* plus the latest available UE-gNB RTT value;  4> start the HARQ-RTT-TimerDL-NTN for the corresponding HARQ process in the first symbol after the end of the corresponding transmission carrying the DL HARQ feedback.  2> else:  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.  NOTE 1a: Void.  NOTE 1b: Void.  2> stop the *drx-RetransmissionTimerDL* for the corresponding HARQ process;  2> stop the *drx-RetransmissionTimerDL-PTM* for the corresponding HARQ process.  \*\*\*\*\*Text omitted\*\*\*\*\*  1> if a DRX group is in Active Time; or  1> if DRX is not configured and multicast DRX is configured:  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; or  2> if the PDCCH indicates a one-shot HARQ feedback as specified in clause 9.1.4 of TS 38.213 [6]; or  2> if the PDCCH indicates a retransmission of HARQ feedback as specified in clause 9.1.5 of TS 38.213 [6]:  3> if this Serving Cell is configured with *downlinkHARQ-FeedbackDisabled*:  4> if the corresponding HARQ process is configured with HARQ feedback enabled:  5> set *HARQ-RTT-TimerDL-NTN* for the corresponding HARQ process equal to *drx-HARQ-RTT-TimerDL* plus the latest available UE-gNB RTT value;  5> start the *HARQ-RTT-TimerDL-NTN* for the corresponding HARQ process in the first symbol after the end of the corresponding transmission carrying the DL HARQ feedback.  3> else:  4> 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* for the corresponding HARQ process(es) whose HARQ feedback is reported;  3> stop the *drx-RetransmissionTimerDL-PTM* for the corresponding HARQ process;  \*\*\*\*\*Text omitted\*\*\*\*\* |

### *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. |
| MediaTek | Yes but | We assume there is no reason for UEs not support PTP/PTP retx for multicast. According to WID, UE is required to receive multicast and unicast simultaneously:   |  | | --- | | Specify a group scheduling mechanism to allow UEs to receive Broadcast/Multicast service [RAN1, RAN2]:  This objective includes specifying necessary enhancements that are required to enable simultaneous operation with unicast reception. | |
| 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?  [Samsung] Tend to agree that UE has no problem on this. But it was agreed in RAN1. |
| Nokia | No strong view | We agree that UE need not start unicast drxHARQ-RTT-TimerDL when receiving PTM transmission if the UE does not support PTP retransmission via C-RNTI. This should be obvious though and could be left for UE implementation (as we usually prefer not to mix capabilities and Stage 3 UP descriptions). |
| Ericsson | No | It seems there are no critical error to solve, rather an optimization. |
| Intel | No strong view |  |
| Qualcomm | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| ZTE | No | can be left to UE decision. |
| Sharp | Yes |  |
| Xiaomi | No strong view |  |
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< Summary >

- Yes: 10 companies (ASUSTek, Lenovo, CATT, Huawei, Google, MediaTek, Qualcomm, Apple, vivo, Sharp)

- No: 4 companies (LGE, Samsung, Ericsson, ZTE)

- No strong view: 4 companies (OPPO, Nokia, Intel, Xiaomi)

Comparing support and objection, support was more than objection, although four companies had no strong view at all.

**Proposal 4 (10/14): RAN2 will try to clarify the MAC entity does not 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. FFS: Detail (to be discussed in RAN2#120)**

## 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 transmission  if 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 received  if a DRX Command MAC CE with PDCCH addressed to a G-RNTI is received |

**- Option 3: No change**

**- Option 4:**

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

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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 |
| MediaTek | Option 1 |  |
| OPPO | No strong view, option 1 is better. |  |
| Nokia | Option 4 | MAC CE are received on PDSCH which is indicated by PDCCH addressed to C-RNTI (PDCCH does not carry MAC CEs). |
| Ericsson | Option 1,4 |  |
| Intel | Option 4 | Slightly prefer Option 4. |
| Qualcomm | Option 4 | Slightly prefer Option 4 |
| Apple | Option 1, 4 |  |
| vivo | Option 3 | It is just a modeling issue. We think the current spec does not cause any misunderstanding or technical issues. Thus, there is no need to modify the test, especially, the legacy text. |
| ZTE | option 4. | slightly prefer option 4 |
| Sharp | Option 1 | slightly prefer option 1 |
| Xiaomi | Optino 1 or 4 |  |
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< Summary >

- Option 1: 12 companies (LGE, ASUSTek, Lenovo, Huawei/HiSilicon, Google, Samsung, MediaTek, OPPO, Ericsson, Apple, Sharp, Xiaomi)

- Option 2: 3 companies (Lenovo, Google, Samsung)

- Option 3: 1 company (vivo)

- Option 4: 7 companies (Nokia, Ericsson, Intel, Qualcomm, Apple, ZTE, Xiaomi)

- Other: 1 company (CATT)

The rapporteur thinks that Option 1 does not have a critical issue.

**Proposal 5: “a DRX Command MAC CE with DCI scrambled with C-RNTI/G-RNTI” is modified by “a DRX Command MAC CE indicated by PDCCH addressed to C-RNTI/G-RNTI”.**

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.  LGE2: @Samsung and CATT, I think, the issue is about UE behaviour rather than NW behaviour. With the current text only, one UE may consider a transmission received on PDCCH addressed to C-RNTI as a unicast transmission. In other words, a unicast transmission is understood as Layer 1 level in this UE case. But, another UE may consider a transmission not intended for MTCH as a unicast transmission. In this case, a unicast transmission is understood as Layer 2 level. Then, the first UE may apply DRX command MAC CE for multicast DRX cycle to unicast DRX cycle. This ambiguity needs to be removed. |
| MediaTek | Yes | We think it is ok to clarify. It seems more to be a clarification, not the limit to network behavior |
| OPPO | No |  |
| Nokia |  | No strong view |
| Ericsson | No | The term unicast is quite well established. |
| Intel | No strong view |  |
| Qualcomm | - | While the intent is ok, the proposed NOTE text is more confusing than clarifying.  If one reads as it is, it looks like it is clarifying Network behavior (i.e., unicast transmission can never contain a MAC SDU for MTCH logical channel), but in fact the intent is to say the procedure applies only when the MAC PDU containing the MAC CE does not contain a MAC SDU intended for MTCH logical channel. |
| Apple | No strong view |  |
| vivo | No | We believe the NW implementation would avoid this weird case. |
| Sharp |  | No strong view. |
| Xiaomi | No strong view |  |
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< Summary >

- Yes: 3 companies (LGE, Lenovo, MediaTek)

- No: 7 companies (CATT, Huawei/HiSilicon, Google, Samsung, OPPO, Ericsson, vivo)

- No strong view: 6 companies (ASUSTek, Nokia, Intel, Apple, Sharp, Xiaomi)

- Other: 1 company (Qualcomm – The note is confusing)

Clear majority of companies did not agree that it is essential.

**Proposal 6 (13/17): NW ensures that the unicast transmission does not contain a MAC SDU for MTCH logical channel (no specification change)**

## 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 |
| MediaTek | Yes |  |
| OPPO | Yes |  |
| Ericsson | Yes |  |
| Intel | No strong view |  |
| Apple | Yes |  |
| vivo | Yes (Proponent) |  |
| ZTE | Yes | OK to be consistent with other spec. |
| Sharp | Yes |  |
| Xiaomi | Yes |  |
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< Summary >

All companies except one companies agreed. One company had no strong view.

**Proposal 7 (15/16): Multiplexing block is added to Figure 16.10.3-2 in TS 38.300, according to R2-2209416.**

## 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. |
| MediaTek | Yes |  |
| OPPO | Yes |  |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| Intel | Yes |  |
| Qualcomm | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| ZTE | Yes |  |
| Sharp | Yes |  |
| Xiaomi | Yes |  |
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All companies agreed.

**Proposal 8 (all): “except for the DL HARQ process being used for MBS broadcast” is added for not considering the next transmission as the very first transmission.**

## 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. |
| MediaTek | Yes | We prefer the word “latest”. |
| OPPO | No | PDCP spec is enough. |
| Nokia | Yes, but | Where would the note be captured ? |
| Ericsson | No | The use of applicable configuration is already clear in RRC |
| Intel | Yes |  |
| Qualcomm | No | PDCP spec should be better and enough. |
| Apple | No | PDCP spec is sufficient. |
| vivo | No | Having this NOTE in PDCP spec is sufficient. |
| ZTE | No | Assuming this will be captured in PDCP spec. |
| Sharp | No | Prefer to be capatured in PDCP spec. |
| Xiaomi | No |  |
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< Sumamry >

- Yes: 8 companies (LGE, ASUSTeK, Lenovo, Huawei/HiSilicon, Google, MediaTek, Nokia, Intel)

- No: 10 companies (CATT, Samsung, OPPO, Ericsson, Qualcomm, Apple, vivo, ZTE, Sharp, Xiaomi)

Less than majority supported a similar note in RRC. The rapporteur thinks it is not about the normative text and PDCP spec will have the not. No Note in RRC is proposed.

**Proposal 9 (10/18): Only PDCP spec will have the following note:**

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

## 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. |
| MediaTek | No |  |
| OPPO | No |  |
| Nokia | No |  |
| Ericsson | No |  |
| Intel | No |  |
| Apple | No |  |
| vivo | No |  |
| ZTE | There might be desync issues. | Let us focus on the RRC re-establishment scenario. in such case,  - MRB is suspended upon UE initialize the RRCReestablishmentRequest  - MRB is resumed upon the first RRCReconfiguration message after RRC re-establishment  please note RB suspend only means the L2 entities are in a kind of "frozen" state according to RAN2-115e meeting agreements:  **- [011] RAN2 confirms that all the L2 entities do not transmit/receive any data to/from lower/upper layers for suspended RBs. No change to the specifications.**    upon RB resume, the PDCP reception window at UE side might lose sync to network, since network is still transmitting data to other UE but not a UE with RLF/RRC re-establishment. this is also confirmed in Nokia paper (R2-2209951): "As long as the gap is smaller than the PDCP window size, there is no issue with HFN desync." however, the size of the gap can not be guaranteed to be smaller than the PDCP window size, especially for a UE who just got its RRC connection re-established.  Rel-17 aims to avoid such desync issue. This is why we spend a long time introducing PDCP variable configured from network, and a long time eliminating bugs in CR phase.  But we are still facing the risk of such issue.  That is why we suggest that network can configure RX\_DELIV anytime network think it is needed, i.e., to simply make it optional, not limited to the MRB setup (for AM MRB), e.g., in above RRC re-establishment scenario.  If we can have this 331/323 CR (ZTE, R2-2209747, R2-2209748),  - we wont need to make exception here and there in 323 spec. (as in P1)  - our CR to 331 and 323 is a solution for all scenarios (hopefully), and  - RAN3/SA2 benefits as well (network wont wait till data arrives to be able to configure UE the MRB in which RX\_DELIV is a mandatory IE.) |
| Sharp | No |  |
| Xiaomi | No |  |
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< Summary >

All companies except one company agreed that there is critical issue. ZTE provided their concern, but it was not supported by other companies.

**Proposal 10 (16/17): RAN2 confirms no serious issue on “Do not reset RX\_NEXT and RX\_DELIV to the initial value when MRB PDCP is suspended”**

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 |  |
| MediaTek | Yes |  |
| OPPO | Yes |  |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| Intel | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| ZTE |  | please kindly check our response to above question. |
| Sharp | Yes |  |
| Xiaomi | Yes |  |
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All companies except one company agreed. ZTE assumes a critical issue in 8-1.

**Proposal 11 (16/17): There is no need for configuration of initial value of RX\_DELIV when PDCP is re-established for AM MRB (no specification change)**

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 |  |
| MediaTek | No | Different from the PDCP init for DRB, the PDCP initialization for MRB is the behavior to synchronize the PDCP COUNT between network and UE. Since this won’t happen when PDCP suspend, it’s better to allow doing this when the deactivated session is activated, to ensure the COUNT is synchronized. (it can be up to network implementation)  Therefore, it’s better allow the IE initialRXDELIV-r17 to be present when RRC resume. |
| OPPO | Yes |  |
| Nokia | Yes | When MBS is deactivated, the network may or may not release the MRB. If the MRB is not released, the UE expects PDCP COUNT to continue. If MRB is released and a new added, the RX\_DELIV is initialised to *initialRX-DELIV* which should be the last PDCP COUNT before deactivation but strictly speaking from UE point of view in this case PDCP COUNT does not continue since a new PDCP entity is established.  We agree that no spec change is needed. |
| Ericsson | Yes | No changes. |
| Intel | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| ZTE | No | based on SA2 spec, for an inactive session, radio resource shall be released.  apparently,  - MRB is part of the radio resource  - RAN shall follow the architectural design.  therefore, in such case, MRB is released and setup.  Current spec works well. |
| Sharp | Yes | No specification impact. |
| Xiaomi | Yes |  |
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< Summary >

- Yes: 15 companies (LGE, ASUSTeK, Lenovo, CATT, Huawei/HiSilicon, Google, Samsung, OPPO, Nokia, Ericsson, Intel, Apple, vivo, Sharp, Xiaomi)

- No: 2 companies (MediaTek, ZTE)

The proposal is to confirm the procedure based on the current RAN2 specification and the proposal for Q8-2. Then, NW will have two options: 1) continue PDCP COUNT 2) release and add MRB.

**Proposal 12 (15/17): NW may configure to continue PDCP COUNT when a deactivated MBS multicast session is activated. (no specification change only for this proposal)**

# Conclusion