**3GPP T****SG-RAN WG2 Meeting #121 R2-23xxx**

**Athens, Greece, Feburary 27th – March 3rd, 2023**

**Agenda item: 6.2.3**

**Source: vivo**

**Title: Report of [AT121][604][MBS-R17] Remaining UP issues**

**Document for: Discussion and Decision**

# 1 Introduction

This contribution is aimed at reporting the discussion and results of the following offline discussion:

* [AT121][604][MBS-R17] Remaining UP issues (vivo)

Scope: Treat remaining issues submitted to 6.2.3, i.e. check with companies which changes are needed and agreeable and which are not.

Outcome: Report summarizing which CRs/changes can be agreed and which not, can consider preparing a common CR with agreeable changes, if needed/more convenient

Deadline: Friday CB session

The discussion scope is to gather companies’ views on the contributions [1]-[4].

# 2 Participants

To facilitate this offline discussion amongst the delegates, would you please fill in your name and the email address in the table below.

|  |  |
| --- | --- |
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# 3 Discussion

## 3.1 Unnecessary start of *drx-HARQ-RTT-TimerDL* in case UE does not support PTP retransmission

In previous RAN2 meetings, the following agreements were reached regarding the start of *drx-HARQ-RTT-TimerDL*:

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| RAN2#116bis e-meeting 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.   RAN2#119bis e-meeting agreement:   * 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)   RAN2#120 meeting agreement:   * After receiving a PTM transmission, drx-HARQ-RTT-TimerDL is started for PTP retransmission if the first HARQ-ACK reporting mode (i.e. ack-nack) is configured. Capture a related text suggested for proposal 1 in R2-2211870. * After receiving a PTM transmission scheduled by configured downlink multicast assignment, drx-HARQ-RTT-TimerDL is started for PTP retransmission if CS-RNTI is configured. Capture a related text suggested for proposal 2 in R2-2211870. * We do not clarify this at all for now due to objections for either option. |

In sub-clause 2.2 of [1], it is argued that, according to the current specification, even if UE does not support PTM retransmission via C-RNTI, the UE will still start *drx-HARQ-RTT-TimerDL* for the corresponding HARQ process after receiving a PTM transmission, which will unnecessarily waste UE’s power.

To make a way forward for this issue (i.e. not introducing UE capability to the normal procedure and not introducing indication to RRC signalling), it is proposed that RAN2 clarifies this issue by a NOTE

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| * **NOTE: the UE only starts *drx-HARQ-RTT-TimerDL* after receiving a PTM transmission if *ptp-Retx-Multicast* or *ptp-Retx-SPS-Multicast* was included in the *UECapabilityInformation* message to network.** |

**Q1: Do companies agree with the NOTE and capture it into MAC spec?**

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| **Company** | **Agree with the NOTE?**  **(Yes/No/Comments)** | **Agree to capture the NOTE into MAC spec?**  **(Yes/No/Comments)** | **Detailed comments** |
| Xiaomi | Yes | Yes |  |
| Samsung | Yes with comments | Yes with comments | Prefer to capture in the NOTE in a negative manner as:  **NOTE: the UE needs not start *drx-HARQ-RTT-TimerDL* after receiving a PTM transmission if *ptp-Retx-Multicast* or *ptp-Retx-SPS-Multicast* was not included in the *UECapabilityInformation* message to network.** |
| MediaTek | Yes | Yes |  |
| Nokia | No | No | We don't want to make MAC procedure dependent on capabilities, and adding a note does not change the normative text.  We see no problem if UE starts the timer even if it would not support multicast or ptp-ret-sps-multicast. So whether UE not supporting these features starts the timer is no issue but we are ok to allow not starting if people see it is not already clear from the specification. But mandating not starting is not required. The wording in the comments from Samsung sounds better. |
| Ericsson |  | No | Agree with Nokia, the association to capability in MAC is something we should avoid.  If a note is anyway agreed it could be as Samsung suggests, but negative formulation should be avoided. The note as proposed can instead be improved with the following change:  “**NOTE: the UE may start *drx-HARQ-RTT-TimerDL* only after receiving a PTM transmission if *ptp-Retx-Multicast* or *ptp-Retx-SPS-Multicast* was included in the *UECapabilityInformation* message to**” |
| NEC | Yes | Yes | To avoid unnecessary power consumption, otherwise the drx-RetransmissionTimerDL may be started after the expiration of drx-HARQ-RTT-TimerDL. |
| ASUSTeK | Yes with comments | Yes with comments | Agree with TP suggested by Samsung or Ericsson. |
| CATT | Yes | Yes |  |
| vivo | Yes | No | The current spec is sufficient, as the NW can only cnfigure ACK-NACK reprorting mode when the UE is capble of L1-PTP transmission.  1> if a MAC PDU is received in a configured downlink multicast assignment and CS-RNTI is configured:  2> if the first HARQ-ACK reporting mode (i.e. ack-nack) is configured as specified in TS 38.213 [6]; and  2> if HARQ feedback is enabled: |
| Intel | No | No | Agree with Nokia.  In addition, in current MAC spec, starting of *drx-HARQ-RTT-TimerDL* has the condition of “*if the first HARQ-ACK reporting mode (i.e. ack-nack) is configured as specified in TS 38.213 [6]*”. Our understanding is that typically gNB configures ACK-NACK reporting mode for PTP retransmission. |
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**Summary:**

## 3.2 Unnecessary CSI reporting in case *cfr-ConfigMulticast* is not configured in the current active BWP

Based on the current RRC spec, the enabler for CSI reporting for MBS multicast is configured in the MAC configuration (i.e., *MAC-CellGroupConfig*) which is common for all configured BWPs. In sub-clause 2.3 of [1], it is mentioned that the NW may configure the *allowCSI-SRS-Tx-MulticastDRX-Active-r17* to a UE although it may not be able to receive the multicast service in the current BWP due to absence of *cfr-ConfigMulticast*. In this case, there is no need to report CSI for multicast scheduling. Therefore, there comes Proposal 3 in [1]:

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| **Proposal 3: UE doesn’t need to report CSI if *cfr-ConfigMulticast* is not included in the current active BWP even if the *allowCSI-SRS-Tx-MulticastDRX-Active-r17* is configured*.*** |

**Q2: Do companies agree with Proposal 3 in R2-2301161?**

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| **Company** | **Yes/No/Comments** | **Detailed comments** |
| Xiaomi | Yes |  |
| Samsung | No | As *allowCSI-SRS-Tx-MulticastDRX-Active-r17* is not the only condition to report CSI but multicast UE must also be in Active Time of multicast DRX. If UE is not receiving multicast service in the current Active BWP due to absence of *cfr-configMulticast*, UE is no more in Active Time and would not report CSI. So the issue does not exist. |
| MediaTek | Yes |  |
| LGE | Commnet | We think that the current spec. has no issue regarding this point.  If a UE is in RRC\_CONNECTED and a G-RNTI is configured, UE operates in a BWP configurd with CFR. Otherwise (i.e. a G-RNTI is not configured), multicast DRX for the G-RNTI does not operate. |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| ZTE | No | same feeling with LG. |
| NEC | Yes, but | The intention is OK, but we think this is somehow an abnormal configuration.  The current spec description for CSI reporting is already complicated, we don’t want to add more things in it, maybe we can:  Opt-1. just using a NOTE;  Opt-2. limit the ASN.1 configuration, e.g., adding restriction in the field description, allowCSI-SRS-Tx-MulticastDRX-Active-r17 IE shall not be set to true when UE is not able to receive the multicast service in the current active BWP. |
| CATT | Yes |  |
| vivo | Yes | The intention is okay and have been specified in the current spec. For example, if CFR is not configured, we assume anyway the　all multicast DRXes would ot in ACTIVE TME. |
| Intel | No | Agree with LG. This seems to be an error configuration. |
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**Summary:**

## 3.3 Handling of PDCP re-establishment of an AM MRB

For an MBS multicast session, before the first packet from CN, the gNB may have no clue how to set the initial PDCP variables and may therefore have to configure a random value, and when the first packet comes to the gNB, the gNB may reconfigure *initialRX-DELIV* according to the SN of the packet*.* Currently, the RRC spec enables such reconfiguration without a need to release/add an MRB. In sub-clause 2.4, it is mentioned that there was no motivation to extend the configuration to other cases which may lead to more changes.

To this end, it is proposed to limit the reconfiguration of *initialRX-DELIV* for an AM MRB only to reset the initial AM MRB configuration. With this restriction, no change to the specification is needed. The corresponding observation and Proposals given in [1] are listed below:

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| **Observation 5: The agreement in RAN2#120 to allow reconfiguring *initialRX-DELIV* for AM MRB was mostly to allow resetting the MRB initial configuration, and there was no motivation to extend the reconfigure *initialRX-DELIV* for AM MRB in any case.**  **Proposal 4a: RAN2 to clarify that reconfiguration of *initialRX-DELIV* for an AM MRB is only allowed to reset the initial MRB configuration, i.e. when no data is transferred yet on the AM MRB. No specification change is needed with this restriction.**  **Proposal 4b: If Proposal 4a is not agreeable, RAN2 should discuss how to handle the stored data in the reordering window, how to handle *RX\_REORD* and PDCP T-reordering timer, and how to set the FMC in the PDCP status report, in case the *RX\_DELIV* is initialized during the PDCP re-establishment of an AM MRB.** |

**Q3: Do companies agree with the above observation and proposals?**

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| **Company** | **Yes/No/Comments** | **Detailed comments** |
| Xiaomi | Yes for 4a | We think that Proposal 4a is aligned with the previous RAN2 agreement and the discussion which we had in the last RAN2 meeting. If most companies consider that this should be clarified, we would slightly prefer to add some guidance in 38.300. |
| Samsung | Comments | Sympathy with P4a. But it can be controlled by NW implementation. |
| MediaTek | - | Agree with P4a that no spec change is needed for this restriction. It should be up to network to ensure such issue (describe in observation 4) won’t happened.  [ **Observation 4: If the RX\_DELIV is initialized during the PDCP re-establishment of an AM MRB, it is unclear how to handle the stored data in the reordering window before initialization and how to set the FMC in the PDCP status report.**] |
| LGE | Agree with P4a | The problem case is to update state variable (initialRX-DELIV) when some data is stored in the PDCP rx buffer.  To make it sure to avoid the case, we propose to capture the following text (modification from P4a) in the field description of initalRX-DELIV in RRC spec.   * Reconfiguration of initialRX-DELIV for an AM MRB is only allowed at the initial MRB configuration, i.e. when no data is transferred yet on the AM MRB. |
| Nokia | Yes | 4a) ok  4b) There are issues without 4a |
| Ericsson | Comment | The resulting issue would be caused by bad NW implementation, and as such is easy to understand, no specification text is needed to guide the use of initialRX-DELIV. |
| ZTE |  | same view with Samsung/MediaTek/Ericsson. |
| NEC | Yes | The intention is OK. And some suggestion as following:  RAN2 to clarify that reconfiguration of initialRX-DELIV for an AM MRB is only allowed to setthe initial MRB configuration, i.e. when no data is transferred yet on the AM MRB. |
| ASUSTeK |  | Agree with LG. |
| CATT | Yes for p4a |  |
| vivo | Okay for P4a |  |
| Intel | Comment | Agree with the intention of proposal 4a. But this can be handled by network implementation, without specification impact. |
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**Summary:**

## 3.4 HARQ feedback for the first transmission after MBS SPS activation

In [1], the following Proposal 1 is given as the component thinks it is not clear which PUCCH resource is used for HARQ feedback of the first SPS PDSCH if the ACK-NACK mode is disabled or the NACK-only mode is configured for the multicast SPS.

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| **Proposal 1: Send an LS to ask RAN1 to clarify following issues:**   * **which PUCCH resource is used for HARQ feedback of the first SPS PDSCH if the NACK-only mode is configured for the multicast SPS** * **whether setting HARQ feedback to disabled is applied to the first SPS PDSCH reception after activation** * **which PUCCH resource is used for HARQ feedback of the first SPS PDSCH if the ACK-NACK mode is disabled for the multicast SPS** |

**Q4: Do you see the necessity to send an LS to RAN1 to clarify the above bullets?**

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| **Company** | **Yes/No/Comments** | **Detailed comments** |
| Xiaomi |  | We are open for the LS to RAN1. However which PUCCH resource is used for HARQ feedback is normally determined by RAN1. It seems difficult for RAN2 to provide a concrete question on these issues. Probably companies who observed these issues can raise a paper in RAN1, and discuss these issues in RAN1 directly to avoid some back-and-forth LSs. |
| Samsung | No | No strong need for LS to RAN1. Companies proposals are already addressing MAC spec changes required. We think Vivo or LG’s proposed change is ok. |
| MediaTek | - | OK to send if majority companies have the similar view. But even RAN1 don’t have the consensus for these question and it is still under discussion. |
| LGE | No | It is scope of R1. If there is some issue. RAN1 people can recognize it and will discuss it. Regardinging the case of HARQ feedback disabled case, we’re aware of that RAN1 is discussing it in this meeting. |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| NEC | No strong view |  |
| ASUSTeK | No | Share the same view with LG. |
| CATT | Yes |  |
| vivo | No | RAN1 is already discussing this. We can just wait for RAN1 conclusion. |
| Intel | Yes |  |
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**Summary:**

Further, as mentioned in [2][4], the current PHY spec specifies that the NACK only HARQ feedback is not applicable for the first SPS PDSCH reception after activation of SPS PDSCH receptions, which is not captured in the MAC spec. So the following changes are given by [2] and [4] respectively,

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| **Opt 1 R2-2301459:**  1> if the HARQ process is associated with a transmission indicated with a G-RNTI or a G-CS-RNTI or a configured downlink assignment (except the first transmission of configured downlink assignment) for MBS multicast and NACK only HARQ feedback is configured and the data for this TB is successfully decoded; or  **Opt 2 R2-2301732:**  1> if the HARQ process is associated with a transmission indicated with a G-RNTI or a G-CS-RNTI or a configured downlink assignment for MBS multicast and NACK only HARQ feedback is configured and the data for this TB is successfully decoded and the transmission is not the first multicast SPS transmission after activation of the configured downlink assignment for MBS multicast; |

Note that there is a parallel discussion on whether the HARQ-ACK/NACK is still applicable for the first SPS PDSCH reception after activation of SPS PDSCH receptions when the HARQ feedback is disabled in RAN1. The rapporteur thinks we should wait for more progress from RAN1 before the discussion.

**Q5: Do companies agree with the intention of those CRs? If agreeable, which option is preferable?**

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| **Company** | **Opt1/Opt2/No/Comments** | **Detailed comments** |
| Samsung | Opt1 | Opt1 is simple and clear |
| MediaTek | Option 2 |  |
| LGE | Opt2 | Proponent of Opt 2.  It should be clear that the first transmission is “the first multicast SPS transmission” after multicast SPS activation. |
| Nokia | No | As mentioned in section 3.4 (Huawei Proposal) we may need LS to RAN1 to clarify this |
| Ericsson | Opt2, comments | Option 2 is clearer if this is to be clarified in specification. Depends on if any clarification/understanding is needed from RAN1. |
| NEC | Opt1 | But if we send LS, can wait |
| ASUSTeK | Opt 2 |  |
| CATT | Opt2 |  |
| vivo | No strong view |  |
| Intel | Opt1 |  |
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**Summary:**

Next, for [3], the company proposed:

Reason for change:

There is an R2-116ibs-e agreement that if MBS SPS in configured and CS-RNTI is not configured, the retransmission of SPS via PTP is not supported. Based on the agreement, *drx-HARQ-RTT-TimerDL* is started for PTP retransmission if CS-RNTI is configured after receiving a PTM transmission scheduled by configured downlink multicast assignment or by G-CS-RNTI. For the former case (i.e. scheduled by configured downlink multicast assignment), the corresponding changes are reflected in v17.3.0. But, the latter case (i.e. scheduled by G-CS-RNTI) is not taken into account in the current MAC spec. Therefore, *drx-HARQ RTT-TimerDL* is started even when CS-RNTI is not configured in the latter case. It is not the expected UE behaviour.

Change in CR:

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| **… <unchanged part is omitted>…**  When multicast DRX is not configured for a G-RNTI or G-CS-RNTI and unicast DRX is configured, the MAC entity shall for this G-RNTI or G-CS-RNTI:  1> monitor the PDCCH as specified in TS 38.213 [6];  1> if the PDCCH addressed to G-RNTI indicates a DL multicast transmission; or  1> if the PDCCH addressed to G-CS-RNTI indicates a DL multicast transmission and CS-RNTI is configured; or  1> if a MAC PDU is received in a configured downlink multicast assignment and CS-RNTI is configured:  2> if the first HARQ-ACK reporting mode (i.e. ack-nack) is configured as specified in TS 38.213 [6]; and  2> if HARQ feedback is enabled:  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* for the corresponding HARQ process.  **… <unchanged part is omitted>…**  1> if the MAC entity is in Active Time for this G-RNTI or G-CS-RNTI:  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> if the first HARQ-ACK reporting mode (i.e. ack-nack) is configured as specified in TS 38.213 [6]:  5> if the PDCCH addressed to G-RNTI indicates a DL multicast transmission; or  5> if the PDCCH addressed to G-CS-RNTI indicates a DL multicast transmission and CS-RNTI is configured:  6> 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.  2> if the PDCCH indicates a new multicast transmission for this G-RNTI or G-CS-RNTI:  3> start or restart *drx-InactivityTimerPTM* in the first symbol after the end of the PDCCH reception.  **… <unchanged part is omitted>…** |

**Q6: Do companies agree with changes in R2-2301731?**

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| **Company** | **Yes/No/Comments** | **Detailed comments** |
| Samsung | No | Not needed. The current MAC behaviour is that HARQ RTT timer is started only if HARQ feedback is transmitted irrespective of resource type. Nothing needs to be specified.  Additonal proposed condition “CS-RNTI is configured” is an optimization in our view. Nothing is broken. |
| LGE | Yes | Proponent of the change.  PTP retransmission for SPS can be support if CS-RNTI is configured. A PTP retx case of transmission scheduled by configured DL multicaset assignment is taken in the previous meeting. However, the other PTP retx case (i.e. transmisison scheduled by G-CS-RNTI) was missed. The proposed change is to make up the missed point. |
| Nokia | Yes |  |
| Ericsson | Comment | No strong opinion, but the change is not really required. |
| ASUSTeK | Comment | No strong view (Yes is ok). This change seems to focus on a scenario that for a MAC PDU received in a configured downlink multicast assignment, gNB firstly schedule a first re-transmission by multicast (G-CS-RNTI) and then may schedule a second re-transmission by unicast (CS-RNTI). |
| vivo | NO | Same view with Samsung |
| Intel | Yes |  |
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**Summary:**

## 3.5 Miscellaneous correction

In [2], the following miscellaneous corrections are proposed,

Reason for change:

1. For NR MBS multicast, either *harq-FeedbackEnablerMulticast* or *harq-FeedbackOptionMulticast* (i.e. ACK NACK or NACK only HARQ feedback) is configured on per G-RNTI or per G-CS-RNTI level. However, the descriptions “HARQ feedback is disabled” and “NACK only HARQ feedback is configured” used in clause 5.3.2.2 are quite not clear. It is not sure whether they should be interpreted as “HARQ feedback is disabled”/“NACK only HARQ feedback is configured” for a G-RNTI/G-CS-RTNI, or as “HARQ feedback is disabled”/ “NACK only HARQ feedback is configured” for all the configured G-RNTI/G-CS-RTNI(s). Some clarification is needed. Besides, it is not clear when the condition “HARQ feedback is disabled” is satisfied. This is because HARQ feedback report can not be configured as “disabled” and there is no description telling when HARQ feedback is considered disabled. To this end, a reference to PHY spec is needed.
2. The term “MTCH” in clause 5.3.2.2 should have been “broadcast MTCH” for text alignment.

The first change:

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| 1> if the HARQ process is associated with a transmission indicated with a Temporary C-RNTI and the Contention Resolution is not yet successful (see clause 5.1.5); or  1> if the HARQ process is associated with a transmission indicated with a MSGB-RNTI and the Random Access procedure is not yet successfully completed (see clause 5.1.4a); or  1> if the HARQ process is equal to the broadcast process; or  1> if the HARQ process is associated with a transmission indicated with a MCCH-RNTI or a G-RNTI for MBS broadcast; or  1> if the HARQ process is associated with a transmission indicated with a G-RNTI or a G-CS-RNTI or a configured downlink assignment for MBS multicast and HARQ feedback is disabled for this G-RNTI or G-CS-RNTI, as specified in clause 18 of TS 38.213 [6]; or  1> if the HARQ process is associated with a transmission indicated with a G-RNTI or a G-CS-RNTI or a configured downlink assignment for MBS multicast and NACK only HARQ feedback is configured for this G-RNTI or G-CS-RNTI and the data for this TB is successfully decoded; or  1> if the *timeAlignmentTimer*, associated with the TAG containing the Serving Cell on which the HARQ feedback is to be transmitted, is stopped or expired and if the *cg-SDT-TimeAlignmentTimer*, if configured, is not running; or  1> if the HARQ process is configured with disabled HARQ feedback:  2> not instruct the physical layer to generate acknowledgement(s) of the data in this TB.  1> else:  2> instruct the physical layer to generate acknowledgement(s) of the data in this TB. |

The second change:

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| 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; or  1> 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; or  1> if the HARQ process is associated with a transmission indicated with a MCCH-RNTI for MBS broadcast, and this is the first received transmission for the TB according to the MCCH schedule indicated by RRC; or  1> if the HARQ process is associated with a transmission indicated with a G-RNTI for MBS broadcast, and this is the first received transmission for the TB according to the broadcast MTCH schedule indicated by RRC or according to the scheduling indicated by DCI as specified in TS 38.214 [7]; or  1> if this is the very first received transmission for this TB (i.e. there is no previous NDI for this TB):  2> consider this transmission to be a new transmission.  1> else:  2> consider this transmission to be a retransmission. |

**Q7: Do companies agree with those two changes?**

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| **Company** | **Yes/No/Comments** | **Detailed comments** |
| Xiaomi | Yes |  |
| Samsung | Yes for first change  No for second change | Second change is not needed as the clause is specifically about “a transmission indicated with a G-RNTI for MBS broadcast” and adding broadcast before MTCH is redundant. |
| MediaTek | Yes |  |
| LGE | Agree to 1st change. | We agree to the first change.  But, not agree to the second change. For the second change, it is already clear withtou the change. |
| Nokia | Yes |  |
| Ericsson | 1st ok | 2:nd not needed as this is already clear |
| NEC | Yes | For 1st change, OK as HARQ is configured per G-RNTI or per G-CS-RNTI.  For 2nd change, open as it is no harm. |
| ASUSTeK | Yes |  |
| vivo | Yes (Propoent) |  |
| Intel | OK for 1st change | For the 2nd change, current spec is clear. |
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**Summary:**

# 4 Conclusion

This offline discussion report is summarized with final proposals as follows,

# 5 Reference

1. [R2-2301161](file:///C:\Users\Dwx974486\Documents\3GPP\Extracts\R2-2301161%20MBS%20user%20plane%20Issues.docx), MBS user plane Issues, Huawei, CBN, HiSilicon.
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