**3GPP TSG-RAN WG2 Meeting #124R2-XXXXXXX**

**Chicago, USA, 13 – 17 November 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **38.321** | **CR** |  **1727** | **rev** | **1** | **Current version:** | **17.6.0** |  |
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| *For* [*HE**LP*](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:***  | PTM retransmission reception for multicast DRX with HARQ feedback disabled [PTM\_ReTx\_Mcast\_HARQ\_Disb] |
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| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, AT&T, Qualcomm, Samsung, Verizon, Ericsson |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | TEI18, NR\_MBS-Core |  | ***Date:*** | 2023-11-20 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | PTM retransmissions requested by other UEs cannot be efficiently received by UEs whose HARQ feedback has been disabled (unless the drx onDurationTimerPTM or drx-InactivityTimerPTM are configured so large that HARQ retransmission happens when at least one of them is running). It would be beneficial both for the UEs and the network to allow UEs with HARQ feedback disabled to receive HARQ retransmissions requested by other UEs. |
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| ***Summary of change:*** | In section 5.7b, HARQ disabled UEs start the multicast drx timers drx-HARQ-RTT-TimerDL-PTM and drx-RetransmissionTimerDL-PTM if UE knows when the corresponding DL HARQ feedback would be transmitted if enabled.Implementation of this CR by a Release 17 UE will not cause compatibility issues.**Impact analysis**Impacted 5G architecture options: NR standalone, NR-DC, NE-DCImpacted functionality: NR MBS multicast DRXInter-operability: There is no inter-operability issue foreseen. |
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| ***Consequences if not approved:*** | PTM retransmissions requested by other UEs can not be efficiently received by HARQ disabled UEs. |
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| ***Clauses affected:*** | 5.7b |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS 38.331, 38.306 CR 4504  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## 5.7b Discontinuous Reception (DRX) for MBS Multicast

For MBS multicast, the MAC entity may be configured by RRC with a DRX functionality per G-RNTI or per G-CS-RNTI that controls the UE's PDCCH monitoring activity for the MAC entity's G-RNTI(s) and G-CS-RNTI(s) as specified in TS 38.331 [5]. When in RRC\_CONNECTED, if multicast DRX is configured for a G-RNTI or G-CS-RNTI, the MAC entity is allowed to monitor the PDCCH for this G-RNTI or G-CS-RNTI discontinuously using the multicast DRX operation specified in this clause; otherwise the MAC entity monitors the PDCCH for this G-RNTI or G-CS-RNTI as specified in TS 38.213 [6]. The multicast DRX operation specified in this clause is performed independently for each G-RNTI or G-CS-RNTI and independently from the DRX operation specified in clauses 5.7 and 5.7a.

RRC controls multicast DRX operation per G-RNTI or per G-CS-RNTI by configuring the following parameters:

- *drx-onDurationTimerPTM*: the duration at the beginning of a DRX cycle;

- *drx-SlotOffsetPTM*: the delay before starting the *drx-onDurationTimerPTM*;

- *drx-InactivityTimerPTM*: the duration after the PDCCH occasion in which a PDCCH indicates a new DL multicast transmission for the MAC entity;

- *drx-LongCycleStartOffsetPTM*: the long DRX cycle *drx-LongCycle-PTM* and *drx-StartOffset-PTM* which defines the subframe where the long DRX cycle starts;

- *drx-RetransmissionTimerDL-PTM* (per DL HARQ process for MBS multicast): the maximum duration until a DL multicast retransmission is received;

- *drx-HARQ-RTT-TimerDL-PTM* (per DL HARQ process for MBS multicast): the minimum duration before a DL multicast assignment for HARQ retransmission is expected by the MAC entity.

When multicast DRX is configured for a G-RNTI or G-CS-RNTI, the Active Time includes the time while:

- *drx-onDurationTimerPTM* or *drx-InactivityTimerPTM* or *drx-RetransmissionTimerDL-PTM* for this G-RNTI or G-CS-RNTI is running.

When multicast DRX is not configured for a G-RNTI or G-CS-RNTI, and the *cfr-ConfigMulticast* is configured for at least one of the active BWP(s) of the Serving Cell(s), 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 used 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.

When multicast DRX is configured for a G-RNTI or G-CS-RNTI, and the *cfr-ConfigMulticast* is configured for at least one of the active BWP(s) of the Serving Cell(s), 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> if the first HARQ-ACK reporting mode (i.e. ack-nack) is used as specified in TS 38.213 [6]; and

3> if CS-RNTI is configured:

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.

2> else if *drx-HARQ-RTT-TimerDL-PTM* is configured ~~and UE can determine when the corresponding DL HARQ feedback would be transmitted if enabled:~~

3> start the *drx-HARQ-RTT-TimerDL-PTM* for the corresponding HARQ process in the first symbol after the end of the corresponding ~~HARQ feedback~~ transmission carrying the DL HARQ feedback that would be performed if HARQ feedback were ~~was~~ enabled.

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 indicated by PDCCH addressed to a G-RNTI or G-CS-RNTI, or by a configured downlink multicast assignment is received:

2> stop *drx-onDurationTimerPTM* of the DRX for this G-RNTI or G-CS-RNTI, or the corresponding G-CS-RNTI;

2> stop *drx-InactivityTimerPTM* of the DRX for this G-RNTI or G-CS-RNTI, or the corresponding G-CS-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:

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 used 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> else if *drx-HARQ-RTT-TimerDL-PTM* is configured ~~and UE can determine when the corresponding DL HARQ feedback would be transmitted if enabled:~~

4> start the *drx-HARQ-RTT-TimerDL-PTM* for the corresponding HARQ process in the first symbol after the end of the corresponding ~~HARQ feedback~~ transmission carrying the DL HARQ feedback that would be performed if HARQ feedback were ~~was~~ enabled.

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.

NOTE 1: A PDCCH indicating activation of multicast SPS is considered to indicate a new transmission.

NOTE 2: The UE may start the *drx-HARQ-RTT-TimerDL* after receiving a PTM transmission only if *ptp-Retx-Multicast* or *ptp-Retx-SPS-Multicast* was included in the *UECapabilityInformation* message to network.

The MAC entity needs not to monitor the PDCCH for a G-RNTI or a G-CS-RNTI if it is not a complete PDCCH occasion (e.g. the Active Time for a G-RNTI or a G-CS-RNTI starts or ends in the middle of a PDCCH occasion).