3GPP TSG-RAN WG2 #126 R2-240xxxx

**Fukuoka, Japan, May 20-24, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.321** | **CR** | **1833** | **rev** | **1** | **Current version:** | **18.1.0** |  |
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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 | **X** | Core Network |  |

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| ***Title:*** | Corrections for XR | | | | | | | | | |
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| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_XR\_enh-Core | | | | |  | | ***Date:*** | | 2024-05-27 |
|  |  | | | |  | | |  | |  |
| ***Category:*** | **F** |  | | | | | | ***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 can be 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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19) Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Misc editorial changes are needed as clarified below:   1. In clause 5.4.4, one of the conditions for canceling a random access procedure triggered by a pending SR for DSR is missing, i.e. when all the PDU SDUs associated with the DSR have been discarded. 2. In clause 5.4.5, when at least one LCG with *additionalBS-TableAllowed* configured has UL data available, Refined Long BSR is selected if the amount of the UL data is within the range of the new BS table. However, for this case, the current spec is not clear at which exact moment UE determines whether Refined Long BSR should be used. 3. In clause 5.4.9, there is ambiguity in which LCH in the LCG which has a pending DSR is considered the one associated with the DSR (in order to determine which SR configuration to use). 4. In clause 5.4.9, it is not clear which type of SDU used in the DSR procedure refers to. It should be clarified as PDCP SDUs. 5. In clause 5.4.9, in the definition of PDCP SDUs associated with a pending DSR, the current spec does not cover the case where PSIHI is enabled for the LCG. 6. In clause 5.4,9, the singular form used in the first bullet level in the DSR triggering conditions should be changed to plural form. 7. In RAN2#125, RAN2 agreed that “It is up to UE implementation whether to cancel DSR even if the MAC PDU can accommodate all the delay-critical data but is not sufficient to include the DSR MAC CE and its subheader (i.e. similar to BSR).” The intention of this agreement is that all the pending DSRs shall still be canceled in the specified scenario but what the relaxation means is that it is up to UE implementation whether to include a DSR MAC CE in the MAC PDU. The current spec does not correctly capture this intention. Instead, it implies that UE may not cancel pending DSRs if a DSR MAC CE with delay status information of all SDUs associated with all the pending DSRs is included in a MAC PDU. 8. In clause 5.7, with the formulation “can” in the current text, any value below 65535 can be implemented as upper bound for the counter. Therefore, the NW and UE may end up with different values of *DRX\_SFN\_COUNTER* after UE’s counter reaches its maximum value. 9. UE should initialize *DRX\_SFN\_COUNTER* immediately after its successful reception of a RRC message that reconfigures UE’s DRX configuration, instead of at the time when RRC Reconfiguration Complete message is sent. 10. The current DRX formula may generate wrong DRX cycle or misaligned short DRX and long DRX cycle for certain values of *drx-StartOffset*. 11. In the current DRX formula with non-integer long DRX cycle, there is no need to have a floor and modulo operation on the right-hand side of the equation, because the parameter drx-StartOffset always takes an integer value that is lower than *drx-NonIntegerLongCycle*. 12. Need to clarify that UE only needs to check the availability conditions for a configured uplink grant only if it is configured with UTO-UCI reporting. 13. UE may not be able to determine whether a CG occasion is unused or not by only considering the data that is already in the buffer. For example, UE needs to consider future data arrivals too (if possible). 14. The current text is not clear enough on which CG occasions should be included in the determination of used/unused occasions in the current slot. 15. If a configured uplink grant become not available for use, then its UL-SCH resources should not be considered in any MAC procedures (e.g. intra-UE prioritization). This requirement needs to be captured in the spec. 16. The references to 38.323 on delay-critical data volume in clause 5.4.9 and 6.1.3.72 are not correct. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. In clause 5.4.4, add the following “all the PDCP SDUs associated with the DSR have been discarded” to the list of cancelation conditions for random access procedures triggered by a SR for DSR. 2. In clause 5.4.5, specify that the selection of Refined Long BSR is determined at the moment when the MAC PDU containing the BSR is to be built. 3. In clause 5.4.9, clarify that DSR is triggered per LCH instead of per LCG. 4. In clause 5.4.9, clarify that “SDU” in the DSR procedures refers to to “PDCP SDU”. 5. In clause 5.4.0, clarify that a PDCP SDU associated with a pending DSR should be a delay-critical PDCP SDU as defined in TS38.323, instead of defining it as an SDU whose PDCP discardTimer has a remaining value below *remainingTimeThreshold*. 6. In clause 5.4,9, the singular form used in the first bullet level in the DSR triggering conditions is changed to plural form. 7. In clause 5.4.9, change “can accommodate” to “includes” in the sentence “The MAC entity shall not include a DSR MAC CE in a MAC PDU if the MAC PDU can accommodate the SDUs associated with all the pending DSRs”, because “accommodate” is more related to the size of a MAC PDU but “include” implies after PDU assembly. In addition, add a note which clarifies that “It is up to UE implementation whether the MAC entity includes a DSR MAC CE in a MAC PDU if the MAC PDU can accommodate PDCP SDUs associated with all the pending DSRs but is not sufficient to additionally include the DSR MAC CE and its subheader”. 8. In clause 5.7, add the requirement on maximum value of the DRX\_SFN\_COUNTER from “can” to “is at least”. 9. Remove the text that “in the first symbol of the slot immediately after the first PUSCH transmission which contains the RRCReconfigurationComplete message of the RRC (re-) configuration as specified in TS 38.331 [5]”. 10. Change the formula of short DRX cycle to floor([(DRX\_SFN\_COUNTER × 10240) + (SFN × 10) + subframe number - drx-StartOffset)] modulo (drx-NonIntegerShortCycle)) = 0. 11. Remove the floor and modulo operations from the right-hand side of the DRX formula for non-integer DRX cycles. 12. In clause 5.8.2, restructure the availability conditions of a configured uplink grant to include to include the condition “configured with UTO-UCI”. 13. In clause 5.8.2, remove the restriction of only considering the already buffered data in UE’s determination of unused CG occasions. 14. In clause 5.8.2, add a clarification that before PUSCH transmission over a CG occasion, UE should have determined whether a CG occasion within the subsequent nrofBitsInUTO-UCI valid occasions is going to be used for PUSCH transmission or not. 15. In clause 5.8.2, add a clarifcation that the MAC entity shall not include the UL-SCH resource of a configured uplink grant which is not available for use in its procedures. 16. The references to 38.323 on delay-critical data volume in clause 5.4.9 and 6.1.3.72 are changed from 5.6 to 5.15. | | | | | | | | |
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| ***Consequences if not approved:*** | | The texts that need change may cause confusion to users of the spec. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.4.4, 5.4.5, 5.4.9, 5.7, 5.8.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | |  | | | |
| ***Other specs*** | | **Y** | **X** | Other core specifications | | | TS 38.300 CR 0860  TS 38.323 CR 0139  TS 38.331 CR 4700 | | | |
| ***affected:*** | |  | **X** | Test specifications | | |  | | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | |  | | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |

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| ***This CR's revision history:*** |  |

------------------------------------------- [Start of the 1st change] ----------------------------------------------

### 5.4.4 Scheduling Request

(Text omitted)

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for BSR, which was initiated by the MAC entity prior to the MAC PDU assembly and which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes a BSR MAC CE which contains buffer status up to (and including) the last event that triggered a BSR (see clause 5.4.5) prior to the MAC PDU assembly; or

- the UL grant(s) can accommodate all pending data available for transmission.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for SL-BSR, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and the ongoing Random Access procedure was initiated by the MAC entity prior to the MAC PDU assembly, and this PDU includes an SL-BSR MAC CE which contains buffer status up to (and including) the last event that triggered an SL-BSR (see clause 5.22.1.6) prior to the MAC PDU assembly; or

- the SL grant(s) can accommodate all pending data available, and the ongoing Random Access procedure was initiated by the MAC entity prior to the sidelink MAC PDU assembly for transmission.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for SL-CSI reporting, which has no valid PUCCH resources configured, if:

- the SL grant can accommodate SL-CSI reporting MAC CE for transmission.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for SL-DRX command indication, which has no valid PUCCH resources configured, if:

- the SL grant can accommodate SL-DRX command indication for transmission.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for BFR of an SCell, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU contains a MAC CE for BFR which includes beam failure recovery information of that SCell; or

- the SCell is deactivated (as specified in clause 5.9) and all triggered BFRs for SCells are cancelled.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for BFR of a BFD-RS set of a Serving Cell, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU contains an Enhanced BFR MAC CE or a Truncated Enhanced BFR MAC CE which includes beam failure recovery information of that BFD-RS set of the Serving Cell.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for consistent LBT failure recovery, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes an LBT failure MAC CE that indicates consistent LBT failure for all the SCells that triggered consistent LBT failure; or

- all the SCells that triggered consistent LBT failure recovery are deactivated (see clause 5.9).

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for SL consistent LBT failure recovery, which has no valid PUCCH resources configured, if one of the following conditions is met:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes an SL LBT failure MAC CE that indicates SL consistent LBT failure; or

- all the triggered SL consistent LBT failure recovery are cancelled (see clause 5.31.2).

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for positioning measurement gap activation/deactivation request, which has no valid PUCCH resources configured, if:

- the Positioning Measurement Gap Activation/Deactivation Request MAC CE that triggers the SR corresponding to the Random Access procedure has already been cancelled.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for Timing Advance report, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes a Timing Advance Report MAC CE (see clause 5.4.8).

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for DSR, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes either a DSR MAC CE or all the PDCP SDUs associated with the DSR (see clause 5.4.9); or

- all the PDCP SDUs associated with the DSR have been discarded (see clause 5.4.9).

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for SL-PRS Resource Request, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes a SL-PRS Resource Request MAC CE (see clause 5.22.1.12).

------------------------------------------ [End of the 1st change] -------------------------------------------------

------------------------------------------ [Start of the 2nd change] -----------------------------------------------

### 5.4.5 Buffer Status Reporting

(Text omitted)

For Regular and Periodic BSR, the MAC entity for which *logicalChannelGroupIAB-Ext* is not configured by upper layers shall:

1> if for at least one LCG configured with *additionalBS-TableAllowed,* the amount of UL data available for transmission when the MAC PDU containing the BSR is to be built is within the buffer sizes specified in Table 6.1.3.1-3:

2> report Refined Long BSR for all LCGs which have data available for transmission;

1> else:

2> if more than one LCG has data available for transmission when the MAC PDU containing the BSR is to be built:

3> report Long BSR for all LCGs which have data available for transmission.

2> else if one LCG has data available and is configured with *additionalBS-TableAllowed* and the amount of UL data available for transmission when the MAC PDU containing the BSR is to be built is greater than the largest buffer size specified in Table 6.1.3.1-3:

3> report Long BSR.

2> else:

3> report Short BSR.

For Regular and Periodic BSR, the MAC entity for which *logicalChannelGroupIAB-Ext* is configured by upper layers shall:

1> if more than one LCG has data available for transmission when the MAC PDU containing the BSR is to be built:

2> if the maximum LCG ID among the configured LCGs is 7 or lower:

3> report Long BSR for all LCGs which have data available for transmission.

2> else:

3> report Extended Long BSR for all LCGs which have data available for transmission.

1> else:

2> report Extended Short BSR.

For Padding BSR, the MAC entity for which *logicalChannelGroupIAB-Ext* is not configured by upper layers shall:

1> if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader:

2> if more than one LCG has data available for transmission when the BSR is to be built:

3> if the number of padding bits is equal to the size of the Short BSR plus its subheader:

4> report Short Truncated BSR of the LCG with the highest priority logical channel with data available for transmission.

3> else:

4> report Long Truncated BSR of the LCG(s) with the logical channels having data available for transmission following a decreasing order of the highest priority logical channel (with or without data available for transmission) in each of these LCG(s), and in case of equal priority, in increasing order of LCGID.

2> else:

3> report Short BSR.

1> else if for at least one LCG configured with *additionalBS-TableAllowed*, the amount of UL data available for transmission when the MAC PDU containing the BSR is to be built is within the buffer sizes specified in Table 6.1.3.1-3 and the number of padding bits is equal to or larger than the size of the Refined Long BSR plus its subheader:

2> report Refined Long BSR for all LCGs which have data available for transmission.

1> else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader:

2> report Long BSR for all LCGs which have data available for transmission.

For Padding BSR, the MAC entity for which *logicalChannelGroupIAB-Ext* is configured by upper layers shall:

1> if the number of padding bits is equal to or larger than the size of the Extended Short BSR plus its subheader but smaller than the size of the Extended Long BSR plus its subheader:

2> if more than one LCG has data available for transmission when the BSR is to be built:

3> if the number of padding bits is smaller than the size of the Extended Long Truncated BSR with zero Buffer Size field plus its subheader:

4> report Extended Short Truncated BSR of the LCG with the highest priority logical channel with data available for transmission.

3> else:

4> report Extended Long Truncated BSR of the LCG(s) with the logical channels having data available for transmission following a decreasing order of the highest priority logical channel (with or without data available for transmission) in each of these LCG(s), and in case of equal priority, in increasing order of LCGID.

2> else:

3> report Extended Short BSR.

1> else if the number of padding bits is equal to or larger than the size of the Extended Long BSR plus its subheader:

2> report Extended Long BSR for all LCGs which have data available for transmission.

(Text omitted)

----------------------------------------- [End of the 2nd change] ------------------------------------------------

-------------------------------------- [Start of the 3rd ~ 7th change] ---------------------------------------------

5.4.9 Delay status reporting

The Delay Status Reporting (DSR) procedure is used to provide the serving gNB with delay status of LCGs. This delay status for an LCG includes remaining time, which is the smallest remaining value of the running PDCP *discardTimer* among PDCP SDUs that are buffered for the LCG but have not been transmitted in any MAC PDU as specified in clause 7.3 in TS 38.323 [4], and the total amount of delay-critical UL data for the LCG according to the data volume calculation procedure specified in clause 5.5 in TS 38.322 [3] and clause 5.15 in TS 38.323 [4] for the associated RLC and PDCP entities, respectively.

RRC controls the DSR procedure by configuring the following parameter:

- *remainingTimeThreshold* (per LCG): the threshold on remaining time for triggering a DSR for LCHs within an LCG.

If an LCG is configured for delay status reporting, the MAC entity shall for each LCH within the LCG:

1> if the smallest remaining value of the running PDCP *discardTimer* among all the PDCP SDUs buffered for the LCH that have not been transmitted in any MAC PDU and have not been reported as data volume in a DSR MAC CE becomes below *remainingTimeThreshold* of the LCG; and

1> if there is no DSR pending for the LCH:

2> trigger a DSR for the LCH.

If there is at least one DSR pending, the MAC entity shall:

1> if UL-SCH resources are available for a new transmission and the UL-SCH resources can accommodate the DSR MAC CE plus its subheader as a result of logical channel prioritization:

2> instruct the Multiplexing and Assembly procedure to generate the DSR MAC CE as specified in clause 6.1.3.72.

1> else if there is no pending SR already triggered by the DSR procedure for the same logical channel as of this DSR:

2> trigger a Scheduling Request.

NOTE: The availability of UL-SCH resources for the transmission of the DSR MAC CE follows the same critieria specified in clause 5.4.5.

A PDCP SDU is considered to be associated with a DSR if it has not been transmitted in any MAC PDU and is a delay-critical PDCP SDU (as defined in TS38.323) associated with the LCH which triggered the DSR.

A MAC PDU shall contain at most one DSR MAC CE. A MAC PDU shall not contain a DSR MAC CE if it includes all PDCP SDUs associated with all the pending DSRs.

After a DSR is triggered, it is considered as pending until it is cancelled. The MAC entity shall cancel a pending DSR, when all the PDCP SDUs associated with the DSR have been discarded, or when a MAC PDU is transmitted and this MAC PDU includes a DSR MAC CE that contains the delay information of all the PDCP SDUs associated with the DSR (as described in the clause 6.1.3.72), or when a MAC PDU is transmitted and this MAC PDU includes all the PDCP SDUs associated with the DSR.

NOTE: It is up to UE implementation whether the MAC entity includes a DSR MAC CE in a MAC PDU if the MAC PDU can accommodate all PDCP SDUs associated with all the pending DSRs but is not sufficient to additionally accommodate the DSR MAC CE plus its subheader.

-------------------------------------- [End of the 3rd ~ 7th changes] ---------------------------------------------

------------------------------------- [Start of the 8th and 11th change] -------------------------------------------

## 5.7 Discontinuous Reception (DRX)

The MAC entity may be configured by RRC with a DRX functionality that controls the UE's PDCCH monitoring activity for the MAC entity's C-RNTI, CI-RNTI, CS-RNTI, INT-RNTI, SFI-RNTI, SP-CSI-RNTI, TPC-PUCCH-RNTI, TPC-PUSCH-RNTI, TPC-SRS-RNTI, AI-RNTI, SL-RNTI, SL-CS-RNTI, SL Semi-Persistent Scheduling V-RNTI and cellDTRX-RNTI. When using DRX operation, the MAC entity shall also monitor PDCCH according to requirements found in other clauses of this specification. When in RRC\_CONNECTED, if DRX is configured, for all the activated Serving Cells, the MAC entity may monitor the PDCCH discontinuously using the DRX operation specified in this clause; otherwise the MAC entity shall monitor the PDCCH as specified in TS 38.213 [6].

NOTE 1: Void

RRC controls DRX operation by configuring the following parameters:

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

- *drx-SlotOffset*: the delay before starting the *drx-onDurationTimer*;

- *drx-InactivityTimer*: the duration after the PDCCH occasion in which a PDCCH indicates a new UL, DL or SL transmission for the MAC entity;

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

- *drx-RetransmissionTimerUL* (per UL HARQ process): the maximum duration until a grant for UL retransmission is received;

- *drx-LongCycleStartOffset*: the Long DRX cycle and *drx-StartOffset* which defines the subframe where the Long and Short DRX cycle starts;

- *drx-NonIntegerLongCycleStartOffset* (optional): the Long DRX cycle and *drx-StartOffset* which defines the subframe where the Long and Short DRX cycle start, when the length of the Long DRX cycle and/or the short DRX cycle is not an integer;

- *drx-ShortCycle* (optional): the Short DRX cycle;

- *drx-NonIntegerShortCycle* (optional): the Short DRX cycle whose length is not an integer;

- *drx-ShortCycleTimer* (optional): the duration the UE shall follow the Short DRX cycle;

- *drx-HARQ-RTT-TimerDL* (per DL HARQ process except for the broadcast process): the minimum duration before a DL assignment for HARQ retransmission is expected by the MAC entity;

- *drx-HARQ-RTT-TimerUL* (per UL HARQ process): the minimum duration before a UL HARQ retransmission grant is expected by the MAC entity;

- *drx-RetransmissionTimerSL* (per sidelink process): the maximum duration until a grant for SL retransmission is received;

- *drx-HARQ-RTT-TimerSL* (per sidelink process): the minimum duration before an SL retransmission grant is expected by the MAC entity;

- *drx-LastTransmissionUL* (optional): the configuration to start *drx-HARQ-RTT-TimerUL* after the last transmission within a bundle;

- *ps-Wakeup* (optional): the configuration to start associated *drx-onDurationTimer* in case DCP is monitored but not detected;

- *ps-TransmitOtherPeriodicCSI* (optional): the configuration to report periodic CSI that is not L1-RSRP on PUCCH during the time duration indicated by *drx-onDurationTimer* in case DCP is configured but associated *drx-onDurationTimer* is not started;

- *ps-TransmitPeriodicL1-RSRP* (optional): the configuration to transmit periodic CSI that is L1-RSRP on PUCCH during the time duration indicated by *drx-onDurationTimer* in case DCP is configured but associated *drx-onDurationTimer* is not started;

- *downlinkHARQ-FeedbackDisabled* (optional): the configuration to disable HARQ feedback per DL HARQ process;

- *uplinkHARQ-Mode* (optional): the configuration to set *HARQmodeA* or *HARQmodeB* per UL HARQ process;

- *disableCG-RetransmissionMonitoring* (optional): the configuration to disable starting *drx-HARQ-RTT-TimerUL* for UL transmission over a configured uplink grant;

- *drx-TimeReferenceSFN* (optional): the configuration to indicate how UE initializes *DRX\_SFN\_COUNTER*.

The following UE variable is used for the DRX operation if *drx-NonIntegerLongCycleStartOffset* is configured:

- *DRX\_SFN\_COUNTER*: the counter that increments when SFN changes to 0. The maximum value of this counter is at least 65535.

(*Text omitted*)

1> if the drx-NonIntegerLongCycleStartOffset is configured:

2> increment *DRX\_SFN\_COUNTER* by 1 in the first symbol of a slot in which SFN changes to 0;

2> if DRX is (re-)configured by RRC:

3> if *drx-TimeReferenceSFN* is included in the RRC (re-)configuration which is received during the first half of a hyper frame (i.e., SFN is between 0 and 511):

4> set *DRX\_SFN\_COUNTER* to 1.

3> else:

4> set *DRX\_SFN\_COUNTER* to 0.

1> if the Short DRX cycle is used for a DRX group and the *drx-NonIntegerShortCycle* is not configured, and [(SFN × 10) + subframe number] modulo (*drx-ShortCycle*) = (*drx-StartOffset*) modulo (*drx-ShortCycle*); or

1> if the Short DRX cycle is used for a DRX group and the *drx-NonIntegerShortCycle* is configured, and floor([(*DRX\_SFN\_COUNTER* × 10240) + (SFN × 10) + subframe number − *drx-StartOffset*] modulo (*drx-NonIntegerShortCycle*)) = 0:

2> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe.

1> if the Long DRX cycle is used for a DRX group and the *drx-NonIntegerLongCycleStartOffset* is not configured, and [(SFN × 10) + subframe number] modulo (*drx-LongCycle*) = *drx-StartOffset*; or

1> if the Long DRX cycle is used for a DRX group and the *drx-NonIntegerLongCycleStartOffset* is configured, and floor([(*DRX\_SFN\_COUNTER* × 10240) + (SFN × 10) + subframe number] modulo (*drx-NonIntegerLongCycle*)) = *drx-StartOffset*:

2> if DCP monitoring is configured for the active DL BWP as specified in TS 38.213 [6], clause 10.3:

3> if DCP indication associated with the current DRX cycle received from lower layer indicated to start *drx-onDurationTimer*, as specified in TS 38.213 [6]; or

3> if all DCP occasion(s) in time domain, as specified in TS 38.213 [6], associated with the current DRX cycle occurred in Active Time considering grants/assignments/DRX Command MAC CE/Long DRX Command MAC CE received and Scheduling Request sent until 4 ms prior to start of the last DCP occasion, or during a measurement gap, or when the MAC entity monitors for a PDCCH transmission on the search space indicated by *recoverySearchSpaceId* of the SpCell identified by the C-RNTI while the *ra-ResponseWindow* is running (as specified in clause 5.1.4); or

3> if *ps-Wakeup* is configured with value *true* and DCP indication associated with the current DRX cycle has not been received from lower layers:

4> start *drx-onDurationTimer* after *drx-SlotOffset* from the beginning of the subframe.

2> else:

3> start *drx-onDurationTimer* for this DRX group after *drx-SlotOffset* from the beginning of the subframe.

(*Text omitted*)

------------------------------------- [End of the 8th and 11th change] --------------------------------------------

-------------------------------------- [Start of the 12th~15th change] ---------------------------------------------

### 5.8.2 Uplink

There are two types of transmission without dynamic grant:

- configured grant Type 1 where an uplink grant is provided by RRC, and stored as configured uplink grant;

- configured grant Type 2 where an uplink grant is provided by PDCCH, and stored or cleared as configured uplink grant based on L1 signalling indicating configured uplink grant activation or deactivation.

Type 1 and Type 2 are configured by RRC for a Serving Cell per BWP. Multiple configurations can be active simultaneously in the same BWP. For Type 2, activation and deactivation are independent among the Serving Cells. For the same BWP, the MAC entity can be configured with both Type 1 and Type 2.

A multi-PUSCH configured grant has multiple consecutive configured uplink grants within a *periodicity*. Both Type 1 and Type 2 can be configured for a multi-PUSCH configured grant by RRC.

Only configured grant Type 1 can be configured for CG-SDT or for RACH-less LTM cell switch. CG-SDT can only be configured on initial BWP.

RRC configures the following parameters when the configured grant Type 1 is configured:

- *cs-RNTI*: CS-RNTI for retransmission;

- *cg-SDT-CS-RNTI*: CS-RNTI for CG-SDT retransmission;

- *cg-SDT-RSRP-ThresholdSSB*: an RSRP threshold configured for SSB selection for CG-SDT;

- *cg-RRC-RSRP-ThresholdSSB*: an RSRP threshold configured for SSB selection for RACH-less handover;

- *periodicity*: periodicity of the configured grant Type 1;

- *timeDomainOffset*: Offset of a resource with respect to SFN = *timeReferenceSFN* in time domain;

- *timeDomainAllocation*: Allocation of configured uplink grant in time domain which contains *startSymbolAndLength* (i.e. *SLIV* in TS 38.214 [7]) or *startSymbol* (i.e. *S* in TS 38.214 [7]);

- *nrofHARQ-Processes*: the number of HARQ processes for configured grant;

- *harq-ProcID-Offset*: offset of HARQ process for configured grant configured with *cg-RetransmissionTimer* for operation with shared spectrum channel access;

- *harq-ProcID-Offset2*: offset of HARQ process for configured grant not configured with *cg-RetransmissionTimer*;

- *timeReferenceSFN*: SFN used for determination of the offset of a resource in time domain. The UE uses the closest SFN with the indicated number preceding the reception of the configured grant configuration;

- *timeReferenceH-SFN*: H-SFN used for determination of the offset of a resource in time domain. The UE uses the closest H-SFN with the indicated number preceding the reception of the configured grant configuration.

RRC configures the following parameters when the configured grant Type 2 is configured:

- *cs-RNTI*: CS-RNTI for activation, deactivation, and retransmission;

- *periodicity*: periodicity of the configured grant Type 2;

- *nrofHARQ-Processes*: the number of HARQ processes for configured grant;

- *harq-ProcID-Offset*: offset of HARQ process for configured grant configured with *cg-RetransmissionTimer* for operation with shared spectrum channel access;

- *harq-ProcID-Offset2*: offset of HARQ process for configured grant not configured with *cg-RetransmissionTimer*.

RRC configures the following parameter when retransmissions on configured uplink grant is configured:

- *cg-RetransmissionTimer*: the duration after a configured grant (re)transmission of a HARQ process when the UE shall not autonomously retransmit that HARQ process;

- *cg-SDT-RetransmissionTimer*: the duration after a configured grant (re)transmission of a HARQ process of the initial CG-SDT transmission with CCCH message when the UE shall not autonomously retransmit the HARQ process;

- *cg-RRC-RetransmissionTimer*: the duration after a configured grant (re)transmission of a HARQ process of the initial transmission of RACH-less handover and RACH-less LTM cell switch when the UE shall not autonomously retransmit the HARQ process.

RRC configures the following parameter when a multi-PUSCH configured grant is configured:

*- nrofSlotsInCG-Period*: the number of configured uplink grants in a *periodicity* of a multi-PUSCH configured grant.

RRC configures the following parameter when UTO-UCI (as specified in clause 9.3 in TS 38.213 [6]) is configured for a configured grant:

* *nrofBitsInUTO-UCI* : number of bits in a UTO-UCI bitmap.

For a configured uplink grant, the MAC entity shall:

1> if its associated configured grant is configured with UTO-UCI and it has not been indicated to the lower layers as unused for PUSCH transmission; or

1> if its associated configured grant is not configured with UTO-UCI:

2> if it is associated with a multi-PUSCH configured grant and meets the validity conditions specified in the clause 6.1 in TS 38.214 [7]; or

2> if it is not associated with a multi-PUSCH configured grant:

3> consider it available for use.

The MAC entity shall not include the UL-SCH resource of a configured uplink grant not available for use in its procedures (e.g. in clause 5.4.4).

For a configured grant configured with UTO-UCI, the MAC entity determines if a configured uplink grant which is within the subsequent *nrofBitsInUTO-UCI* valid occasions of its associated configured grant configuration is going to be used for PUSCH transmission by considering at least the amount of buffered data that can be transmitted on the available occasions of the associated configured grant and other available UL-SCH resources. Upon this determination, the MAC entity sends an indication to lower layers, for use in the procedure for reporting UTO-UCI .

(*Text omitted*)

----------------------------------------- [End of the 12th~15th change] ------------------------------------------

------------------------------------------- [Start of the 16th change] ----------------------------------------------

#### 6.1.3.72 Delay Status Report MAC CE

The Delay Status Report (DSR) MAC CE is identified by MAC subheader with an eLCID as specified in Table 6.2.1-2b.

The fields in the DSR MAC CE are defined as follows:

- LCGi: This field indicates the presence of delay information (i.e. the Remaining Time and Buffer Size fields) for the LCG i. The LCGi field set to 1 indicates that the delay information for the LCG i is reported. The LCGi field set to 0 indicates that the delay information for the LCG i is not reported;

- Remaining Time: This field indicates the shortest remaining value of running PDCP *discardTimer* (described in clause 7.3 in TS 38.323 [4]) among all PDCP SDUs that are buffered for an LCG but have not been transmitted in any MAC PDU, at the time of the first symbol of the first PUSCH transmission that includes this DSR MAC CE. The length of this field is 6 bits. This field is present only if the buffer size indicated by the corresponding Buffer Size field is not zero; otherwise, this field is reserved and set to 0. If present, the value *r* in this field indicates a remaining time within the range of (*r*, *r* + 1] msec;

- BT: This field is present only if the corresponding LCG is configured with *additionalBS-TableAllowed* and the buffer size indicated by the corresponding Buffer Size field is not zero;otherwise, this field is reserved and set to 0. If present, the BT field set to 1 indicates that the buffer sizes specified in Table 6.1.3.1-3 are used to set the value of the Buffer Size field, while the BT field set to 0 indicates that the buffer sizes specified in Table 6.1.3.1-2 are used instead;

- Buffer Size: The Buffer Size field indicates the total amount of delay-critical UL data for an LCG according to the data volume calculation procedure specified in clause 5.5 in TS 38.322 [3] and clause 5.15 in TS 38.323 [4] for the associated RLC and PDCP entities, respectively, after the MAC PDU has been built. If the corresponding LCG is configured with *additionalBS-TableAllowed* and the amount of delay-critical UL data for an LCG is within the buffer sizes specified in Table 6.1.3.1-3, the MAC entity shall use the buffer sizes specified in Table 6.1.3.1-3 to set the value of this field; otherwise, the MAC entity shall use Table 6.1.3.1-2 instead. This field is indicated in number of bytes. The length of this field is 8 bits.

The DSR MAC CE shall include delay information of all LCGs which have pending DSRs when the MAC PDU containing this DSR MAC CE is to be built. The Remaining Time, the BT, and the Buffer Size fields for an LCG shall be reported in two consecutive octets. These three fields for different LCGs shall be included in a DSR MAC CE in ascending order based on the LCGi.

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Figure 6.1.3.72-1: DSR MAC CE

------------------------------------------- [End of the 16th change] ----------------------------------------------