**3GPP TSG-RAN WG2 #131bis**

**Prague, Czech Republic, 13th – 17th October 2025**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Introducing SR resources in LTM cell switch MAC CE [LTM\_enh\_SR] | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | |  |
|  | *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:*** | | Using a configured grant seems the best solution for LTM, as the UE would be free to transmit the RRCReconfigurationComplete message without the need to ask for a grant from the network. However, since the times when CHO was specified, reserving (grant) resources for a long time is a big burden for the network, as such resources are scarse.  Since it is not feasible to have a configured grant in each configured LTM candidate cell, the consequence of this is that network most likely will rely heavily of the dynamic grant for the case of LTM. Otherwise, if only configured grant is used this means that only a few LTM candidate cells can be configured at the UE, which translates in lower performance and reliability to handle mobility scenarios.  Because of this, the proposal would be to provide a shorter SR periodicity as possible to the UE so to not delay the sending of the RRCReconfigurationComplete message, in case the dynamic grant is used. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Section 5.3.1 and 5.4.1  - Clarified that UE shall stop using the PUCCH resources configured in ltm-SchedulingRequestResources in ReconfigurationWithSync, if any.  Section 5.18.35  - Clarified that if the SR configuration ID is present in the Enhanced LTM cell switch MAC CE, the UE should consider the related SR configuration for the LTM cell switch procedure.  Section 6.1.3.75 and 6.1.3.75a  - Added new fields for the SR configuration resources ID in the legacy LTM Cell Switch Command MAC CE and the enhanced one. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | If CR is not approved, in case dynamic grant is used for the LTM cell switch, the UE may delay the sending of the SR (because the SR periodicity can be quite large) and this will in turn increase the latency of the LTM cell switch procedure and the interruption of the user plane data | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.3.1, 5.4.1, 5.18.35, 6.1.3.75, 6.1.3.75a | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 38.331 CR XXX | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS 38.306 CR XXX | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*START OF CHANGES*

### 5.3.1 DL Assignment reception

Downlink assignments received on the PDCCH both indicate that there is a transmission on a DL-SCH for a particular MAC entity and provide the relevant HARQ information.

When the MAC entity has a C-RNTI, Temporary C-RNTI, CS-RNTI, G-RNTI or G-CS-RNTI, the MAC entity shall for each PDCCH occasion during which it monitors PDCCH and for each Serving Cell:

1> if a downlink assignment for this PDCCH occasion and this Serving Cell has been received on the PDCCH for the MAC entity's C-RNTI, or Temporary C‑RNTI, or G-RNTI configured for multicast MTCH:

2> if this is the first downlink assignment for this Temporary C-RNTI:

3> consider the NDI to have been toggled.

2> if the downlink assignment is for the MAC entity's C-RNTI, and if the previous downlink assignment indicated to the HARQ entity of the same HARQ process was either a downlink assignment received for the MAC entity's CS-RNTI or G-CS-RNTI, or a configured downlink assignment for unicast or MBS multicast; or

2> if the downlink assignment is for the MAC entity's G-RNTI configured for multicast MTCH, and if the previous downlink assignment indicated to the HARQ entity of the same HARQ process was either a downlink assignment received for the MAC entity's CS-RNTI or G-CS-RNTI, or other G-RNTI, or C-RNTI, or a configured downlink assignment for unicast or MBS multicast:

3> consider the NDI to have been toggled regardless of the value of the NDI.

2> stop the *cg-SDT-RetransmissionTimer*, if it is running, for the corresponding HARQ process for initial transmission with CCCH message;

2> stop the *cg-RRC-RetransmissionTimer*, if it is running, for the corresponding HARQ process for the first PUSCH transmission of RACH-less handover or RACH-less LTM cell switch;

2> stop the *configuredGrantTimer*, if it is running, for the corresponding HARQ process for initial transmission with CCCH message;

2> if the downlink assignment has been received on the PDCCH for the MAC entity's C-RNTI after the first PUSCH transmission to the Serving Cell:

3> if there is an ongoing RACH-less handover procedure:

4> consider the RACH-less handover to be successfully completed and indicate it to upper layers.

3> else if RACH-less LTM cell switch is ongoing:

4> consider the LTM cell switch to be successfully completed and indicate it to upper layers.

NOTE X: After completion of LTM cell switch, the UE stops using the PUCCH resources, if any, configured in *ltm-SchedulingRequestResources* in *ReconfigurationWithSync* TS 38.331 [5].

2> indicate the presence of a downlink assignment and deliver the associated HARQ information to the HARQ entity.

1> else if a downlink assignment for this PDCCH occasion has been received for this Serving Cell on the PDCCH for the MAC entity's CS-RNTI or G-CS-RNTI:

2> if the NDI in the received HARQ information is 1:

3> consider the NDI for the corresponding HARQ process not to have been toggled;

3> indicate the presence of a downlink assignment for this Serving Cell and deliver the associated HARQ information to the HARQ entity.

2> if the NDI in the received HARQ information is 0:

3> if PDCCH contents indicate SPS deactivation:

4> clear the configured downlink assignment for this Serving Cell (if any);

4> if the *timeAlignmentTimer*, associated with the TAG containing the Serving Cell on which the HARQ feedback is to be transmitted, is running, and the Serving Cell is not configured with two TAGs; or

4> if the Serving Cell on which the HARQ feedback is to be transmitted is configured with two TAGs and if the *timeAlignmentTimer* of the TAG, associated with the TCI state(s) used for transmitting the HARQ feedback, is running:

5> indicate a positive acknowledgement for the SPS deactivation to the physical layer.

3> else if PDCCH content indicates SPS activation:

4> store the downlink assignment for this Serving Cell and the associated HARQ information as configured downlink assignment;

4> initialise or re-initialise the configured downlink assignment for this Serving Cell to start in the associated PDSCH duration and to recur according to rules in clause 5.8.1 or in clause 5.8.1a;

For each Serving Cell and each configured downlink assignment, if configured and activated, the MAC entity shall:

1> if the PDSCH duration of the configured downlink assignment does not overlap with the PDSCH duration of a downlink assignment received on the PDCCH for this Serving Cell:

2> instruct the physical layer to receive, in this PDSCH duration, transport block on the DL-SCH according to the configured downlink assignment and to deliver it to the HARQ entity;

2> set the HARQ Process ID to the HARQ Process ID associated with this PDSCH duration;

2> consider the NDI bit for the corresponding HARQ process to have been toggled;

2> indicate the presence of a configured downlink assignment and deliver the stored HARQ information to the HARQ entity.

For configured downlink assignments without *harq-ProcID-Offset*, the HARQ Process ID associated with the slot where the DL transmission starts is derived from the following equation:

HARQ Process ID = [floor (CURRENT\_slot × 10 / (*numberOfSlotsPerFrame* × *periodicity*))]  
 modulo *nrofHARQ-Processes*

where CURRENT\_slot = [(SFN × *numberOfSlotsPerFrame*) + slot number in the frame] and *numberOfSlotsPerFrame* refers to the number of consecutive slots per frame as specified in TS 38.211 [8].

For configured downlink assignments with *harq-ProcID-Offset*, the HARQ Process ID associated with the slot where the DL transmission starts is derived from the following equation:

HARQ Process ID = [floor (CURRENT\_slot × 10 / (*numberOfSlotsPerFrame* × *periodicity*))]  
 modulo *nrofHARQ-Processes* + *harq-ProcID-Offset*

where CURRENT\_slot = [(SFN × *numberOfSlotsPerFrame*) + slot number in the frame] and *numberOfSlotsPerFrame* refers to the number of consecutive slots per frame as specified in TS 38.211 [8].

NOTE 1: In case of unaligned SFN across carriers in a cell group, the SFN of the concerned Serving Cell is used to calculate the HARQ Process ID used for configured downlink assignments.

NOTE 2: CURRENT\_slot refers to the slot index of the first transmission occasion of a bundle of configured downlink assignment.

When the MAC entity needs to read BCCH, the MAC entity may, based on the scheduling information from RRC:

1> if a downlink assignment for this PDCCH occasion has been received on the PDCCH for the SI-RNTI;

2> indicate a downlink assignment and redundancy version for the dedicated broadcast HARQ process to the HARQ entity.

When the MAC entity needs to read MCCH, the MAC entity may, based on the scheduling information from RRC:

1> if a downlink assignment for this PDCCH occasion has been received on the PDCCH for the MCCH-RNTI or Multicast MCCH-RNTI:

2> indicate a downlink assignment and redundancy version for the selected HARQ process to the HARQ entity.

When the MAC entity needs to read broadcast MTCH, the MAC entity may, based on the scheduling information from RRC and DCI:

1> if a downlink assignment for this PDCCH occasion has been received on the PDCCH for the G-RNTI configured for broadcast MTCH:

2> indicate the presence of a downlink assignment and deliver the associated HARQ information for the selected HARQ process to the HARQ entity.

*END OF CHANGES*

*START OF CHANGES*

### 5.4.1 UL Grant reception

Uplink grant is either received dynamically on the PDCCH, in a Random Access Response, configured semi-persistently by RRC or determined to be associated with the PUSCH resource of MSGA as specified in clause 5.1.2a. The MAC entity shall have an uplink grant to transmit on the UL-SCH. To perform the requested transmissions, the MAC layer receives HARQ information from lower layers. For uplink spatial multiplexing, the MAC layer can receive up to two uplink grants (one per HARQ process) on the PDCCH that schedules two TBs as specified in TS 38.212 [9]. An uplink grant addressed to CS-RNTI with NDI = 0 is considered as a configured uplink grant. An uplink grant addressed to CS-RNTI with NDI = 1 is considered as a dynamic uplink grant.

For a BWP configured with *sTx-2Panel,* the MAC entity considers the PUSCH duration of one uplink grant overlaps with the PUSCH duration of another uplink grant if they are overlapping in time and associated with an *srs-ResourceSetId* corresponding to the same *coresetPoolIndex*.

If the MAC entity has a C-RNTI, a Temporary C-RNTI, or CS-RNTI, the MAC entity shall for each PDCCH occasion and for each Serving Cell belonging to a TAG that has a running *timeAlignmentTimer* or a running *cg-SDT-TimeAlignmentTimer* and for each grant received for this PDCCH occasion:

1> if an uplink grant for this Serving Cell has been received on the PDCCH for the MAC entity's C-RNTI or Temporary C-RNTI; or

1> if an uplink grant has been received in a Random Access Response:

2> if the uplink grant is for MAC entity's C-RNTI and if the previous uplink grant delivered to the HARQ entity for the same HARQ process was either an uplink grant received for the MAC entity's CS-RNTI or a configured uplink grant:

3> consider the NDI to have been toggled for the corresponding HARQ process regardless of the value of the NDI.

2> if the uplink grant is for MAC entity's C-RNTI, and the identified HARQ process is configured for a configured uplink grant:

3> start or restart the *configuredGrantTimer* for the corresponding HARQ process, if configured;

3> stop the *cg-RetransmissionTimer* for the corresponding HARQ process, if running.

2> stop the *cg-SDT-RetransmissionTimer* for the corresponding HARQ process, if running.

2> stop the *cg-RRC-RetransmissionTimer* for the corresponding HARQ process, if running.

2> if the uplink grant has been received on the PDCCH for the MAC entity's C-RNTI after the first PUSCH transmission to the Serving Cell; and

2> if the uplink grant is for a new transmission on the same HARQ process used for the first PUSCH transmission to the Serving Cell:

3> if there is an ongoing RACH-less handover procedure:

4> consider the RACH-less handover to be successfully completed and indicate to upper layers.

3> else if there is an ongoing RACH-less LTM cell switch:

4> consider the LTM cell switch to be successfully completed and indicate it to upper layers.

NOTE X: After completion of LTM cell switch, the UE stops using the PUCCH resources, if any, configured in *ltm-SchedulingRequestResources* in *ReconfigurationWithSync* TS 38.331 [5].

2> deliver the uplink grant and the associated HARQ information to the HARQ entity.

1> else if an uplink grant for this PDCCH occasion has been received for this Serving Cell on the PDCCH for the MAC entity's CS-RNTI:

2> if the NDI in the received HARQ information is 1:

3> consider the NDI for the corresponding HARQ process not to have been toggled;

3> start or restart the *configuredGrantTimer* for the corresponding HARQ process, if configured;

3> stop the *cg-RetransmissionTimer* for the corresponding HARQ process, if running;

3> stop the *cg-SDT-RetransmissionTimer* for the corresponding HARQ process, if running;

3> stop the *cg-RRC-RetransmissionTimer* for the corresponding HARQ process, if running;

3> deliver the uplink grant and the associated HARQ information to the HARQ entity;

3> if a logical channel associated with a DRB configured with *survivalTimeStateSupport* is multiplexed in the MAC PDU stored in the HARQ buffer for the corresponding HARQ process:

4> trigger activation of PDCP duplication for all configured RLC entities of the DRB.

2> else if the NDI in the received HARQ information is 0:

3> if PDCCH contents indicate configured grant Type 2 deactivation:

4> trigger configured uplink grant confirmation.

3> else if PDCCH contents indicate configured grant Type 2 activation:

4> trigger configured uplink grant confirmation;

4> store the uplink grant for this Serving Cell and the associated HARQ information as configured uplink grant;

4> initialise or re-initialise the configured uplink grant for this Serving Cell to start in the associated PUSCH duration and to recur according to rules in clause 5.8.2;

4> stop the *configuredGrantTimer* for the corresponding HARQ process, if running;

4> stop the *cg-RetransmissionTimer* for the corresponding HARQ process, if running.

For each Serving Cell and each configured uplink grant, if configured and activated and available for use as specified in clause 5.8.2, the MAC entity shall:

1> if the MAC entity is configured with *lch-basedPrioritization*, and the PUSCH duration of the configured uplink grant does not overlap with the PUSCH duration of an uplink grant received in a Random Access Response or with the PUSCH duration of an uplink grant addressed to Temporary C-RNTI or the PUSCH duration of a MSGA payload for this Serving Cell; or

1> if the MAC entity is not configured with *lch-basedPrioritization*, and the PUSCH duration of the configured uplink grant does not overlap with the PUSCH duration of an uplink grant received on the PDCCH or in a Random Access Response or the PUSCH duration of a MSGA payload for this Serving Cell:

2> set the HARQ Process ID to the HARQ Process ID associated with this PUSCH duration;

2> if, for the corresponding HARQ process, the *configuredGrantTimer* is not running and *cg-RetransmissionTimer* is not configured and *cg-SDT-RetransmissionTimer* is not configured, and *cg-RRC-RetransmissionTimer* is not configured (i.e. new transmission):

3> if the configured uplink grant is for the initial transmission for the CG-SDT with CCCH message; or

3> if there is an ongoing CG-SDT procedure and PDCCH addressed to the MAC entity's C-RNTI has been received; or

3> if the configured uplink grant is for the first PUSCH transmission during an ongoing RACH-less LTM cell switch; or

3> if the configured uplink grant is for the first PUSCH transmission during an ongoing RACH-less handover procedure; or

3> if there is no ongoing CG-SDT nor ongoing RACH-less LTM cell switch nor ongoing RACH-less handover procedure:

4> consider the NDI bit for the corresponding HARQ process to have been toggled;

4> deliver the configured uplink grant and the associated HARQ information to the HARQ entity.

2> else if the *cg-RetransmissionTimer* for the corresponding HARQ process is configured and not running, then for the corresponding HARQ process:

3> if the *configuredGrantTimer* is not running, and the HARQ process is not pending (i.e. new transmission):

4> consider the NDI bit to have been toggled;

4> deliver the configured uplink grant and the associated HARQ information to the HARQ entity.

3> else if the previous uplink grant delivered to the HARQ entity for the same HARQ process was a configured uplink grant (i.e. retransmission on configured grant):

4> deliver the configured uplink grant and the associated HARQ information to the HARQ entity.

2> else if the *cg-SDT-RetransmissionTimer* is configured and not running for the corresponding HARQ process; or

2> if the *cg-RRC-RetransmissionTimer* is configured and not running for the corresponding HARQ process:

3> if the configured uplink grant is for the first PUSCH transmission at RACH-less LTM cell switch (i.e., initial new transmission); or

3> if the configured uplink grant is for the first PUSCH transmission of RACH-less handover (i.e., initial new transmission); or

3> if the configured uplink grant is for the initial transmission for the CG-SDT with CCCH message (i.e., initial new transmission); or

3> if the *configuredGrantTimer* is not running or not configured, and PDCCH addressed to the MAC entity's C-RNTI has been received after the initial transmission of the CG-SDT with CCCH message (i.e., subsequent new transmission):

4> consider the NDI bit to have been toggled;

4> deliver the configured uplink grant and the associated HARQ information to the HARQ entity.

3> if PDCCH addressed to the MAC entity's C-RNTI has not been received and if the previous uplink grant delivered to the HARQ entity for the same HARQ process was a configured uplink grant for initial transmission of CG-SDT with CCCH message or for its retransmission (i.e., retransmission for initial CG-SDT transmission); or

3> if RACH-less handover is not successfully completed and if the previous uplink grant delivered to the HARQ entity for the same HARQ process was a configured uplink grant for the first PUSCH transmission of RACH-less handover or for its retransmission (i.e., retransmission for the first PUSCH transmission for RACH-less handover); or

3> if RACH-less LTM cell switch is ongoing and if the previous uplink grant delivered to the HARQ entity for the same HARQ process was a configured uplink grant for first PUSCH transmission at RACH-less LTM cell switch or for its retransmission (i.e., retransmission for the first PUSCH transmission at RACH-less LTM cell switch):

4> consider the NDI bit to have not been toggled;

4> deliver the configured uplink grant and the associated HARQ information to the HARQ entity.

For configured uplink grants that are not part of a multi-PUSCH configured grant and neither configured with *harq-ProcID-Offset2* nor with *cg-RetransmissionTimer*, the HARQ Process ID associated with the first symbol of a UL transmission is derived from the following equation:

HARQ Process ID = [floor(CURRENT\_symbol/*periodicity*)] modulo *nrofHARQ-Processes*

For configured uplink grants that are not part of a multi-PUSCH configured grant and configured with *harq-ProcID-Offset2*, the HARQ Process ID associated with the first symbol of a UL transmission is derived from the following equation:

HARQ Process ID = [floor(CURRENT\_symbol / *periodicity*)] modulo *nrofHARQ-Processes* + *harq-ProcID-Offset2*

For a multi-PUSCH configured grant (as specified in clause 5.8.2) configured with neither *harq-ProcID-Offset2* nor *cg-RetransmissionTimer*, the HARQ Process ID associated with the first symbol of a UL transmission is derived from the following equation:

HARQ Process ID = [*nrofSlotsInCG-Period*× floor (CURRENT\_symbol / *periodicity*) + ID\_OFFSET] modulo *nrofHARQ-Processes*

For a multi-PUSCH configured grant configured with *harq-ProcID-Offset2*, the HARQ Process ID associated with the first symbol of a UL transmission is derived from the following equation:

HARQ Process ID = [*nrofSlotsInCG-Period* × floor (CURRENT\_symbol / *periodicity*) + ID\_OFFSET] modulo *nrofHARQ-Processes* + *harq-ProcID-Offset2*

where, if *cg-SDT-PeriodicityExt* (as defined in TS 38.331 [5]) is not configured,

CURRENT\_symbol = (SFN × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot* + slot number in the frame × *numberOfSymbolsPerSlot* + symbol number in the slot)

alternatively, if *cg-SDT-PeriodicityExt* (as defined in TS 38.331 [5]) is configured, *periodicity* equals to *cg-SDT-PeriodicityExt*, and

CURRENT\_symbol = ((H-SFN × *numberOfSFNperH-SFN* + SFN) × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot* + slot number in the frame × *numberOfSymbolsPerSlot* + symbol number in the slot).

*numberOfSFNperH-SFN*, *numberOfSlotsPerFrame* and *numberOfSymbolsPerSlot* above refer to the number of consecutive frames per H-SFN, the number of consecutive slots per frame and the number of consecutive symbols per slot, respectively as specified in TS 38.211 [8].

For a multi-PUSCH configured grant, ID\_OFFSET equals 0 for the first configured uplink grant within a *periodicity* of the configuration and K for the Kth (1 ≤ K < *nrofSlotsInCG-Period*) valid configured uplink grant after the first configured uplink grant within the same *periodicity*. A configured uplink grant in a multi-PUSCH configured grant is considered valid if it satisfies the conditions specified in clause 6.1 in TS 38.214 [7].

For configured uplink grants configured with *cg-RetransmissionTimer*, the UE implementation selects an HARQ Process ID among the HARQ process IDs available for the configured grant configuration. If the MAC entity is configured with *intraCG-Prioritization*, for HARQ Process ID selection, the UE shall prioritize the HARQ Process ID with the highest priority, where the priority of HARQ process is determined by the highest priority among priorities of the logical channels that are multiplexed (i.e. the MAC PDU to transmit is already stored in the HARQ buffer) or have data available that can be multiplexed (i.e. the MAC PDU to transmit is not stored in the HARQ buffer) in the MAC PDU, according to the mapping restrictions as described in clause 5.4.3.1.2. If the MAC entity is configured with *intraCG-Prioritization*, for HARQ Process ID selection among initial transmission and retransmission with equal priority, the UE shall prioritize retransmissions before initial transmissions. The priority of a HARQ Process for which no data for logical channels is multiplexed or can be multiplexed in the MAC PDU is lower than the priority of a HARQ Process for which data for any logical channels is multiplexed or can be multiplexed in the MAC PDU. If the MAC entity is not configured with *intraCG-Prioritization*, for HARQ Process ID selection, the UE shall prioritize retransmissions before initial transmissions. The UE shall toggle the NDI in the CG-UCI for new transmissions and not toggle the NDI in the CG-UCI in retransmissions.

NOTE 1: If a configured uplink grant is associated with a multi-PUSCH configured grant, CURRENT\_symbol refers to the symbol index of the first transmission occasion in the first configured uplink grant within the same periodicity. Otherwise, CURRENT\_symbol refers to the symbol index of the first transmission occasion of a bundle of configured uplink grant.

NOTE 2: A HARQ process is configured for a configured uplink grant where neither *harq-ProcID-Offset* nor *harq-ProcID-Offset2* is configured, if the configured uplink grant is activated and the associated HARQ process ID is less than *nrofHARQ-Processes*. A HARQ process is configured for a configured uplink grant where *harq-ProcID-Offset2* is configured, if the configured uplink grant is activated and the associated HARQ process ID is greater than or equal to *harq-ProcID-Offset2* and less than sum of *harq-ProcID-Offset2* and *nrofHARQ-Processes* for the configured grant configuration.

NOTE 3: If the MAC entity receives a grant in a Random Access Response (i.e. MAC RAR or fallbackRAR), or addressed to Temporary C-RNTI or determines a grant as specified in clause 5.1.2a for MSGA payload and if the MAC entity also receives an overlapping grant for its C-RNTI or CS-RNTI, requiring concurrent transmissions on the SpCell, the MAC entity may choose to continue with either the grant for its RA-RNTI/Temporary C-RNTI/MSGB-RNTI/the MSGA payload transmission or the grant for its C-RNTI or CS-RNTI.

NOTE 4: In case of unaligned SFN across carriers in a cell group, the SFN of the concerned Serving Cell is used to calculate the HARQ Process ID used for configured uplink grants.

NOTE 5: If *cg-RetransmissionTimer* is not configured, a HARQ process is not shared between different configured grant configurations in the same BWP.

For the MAC entity configured with *lch-basedPrioritization*, priority of an uplink grant is determined by the highest priority among priorities of the logical channels that are multiplexed (i.e. the MAC PDU to transmit is already stored in the HARQ buffer) or have data available that can be multiplexed (i.e. the MAC PDU to transmit is not stored in the HARQ buffer) in the MAC PDU, according to the mapping restrictions as described in clause 5.4.3.1.2. The priority of an uplink grant for which no data for logical channels is multiplexed or can be multiplexed in the MAC PDU is lower than either the priority of an uplink grant for which data for any logical channels is multiplexed or can be multiplexed in the MAC PDU or the priority of the logical channel triggering an SR.

For the MAC entity configured with *lch-basedPrioritization*, if the corresponding PUSCH transmission of a configured uplink grant is cancelled by CI-RNTI as specified in clause 11.2A of TS 38.213 [6] or cancelled by a high PHY-priority PUCCH transmission as specified in clause 9 of TS 38.213 [6], this configured uplink grant is considered as a de-prioritized uplink grant. If this de-prioritized uplink grant is configured with *autonomousTx*, the *configuredGrantTimer* for the corresponding HARQ process of this de-prioritized uplink grant shall be stopped if it is running. If this de-prioritized uplink grant is configured with *autonomousTx*, the *cg-RetransmissionTimer* for the corresponding HARQ process of this de-prioritized uplink grant shall be stopped if it is running.

When the MAC entity is configured with *lch-basedPrioritization*, for each uplink grant delivered to the HARQ entity and whose associated PUSCH can be transmitted by lower layers, the MAC entity shall:

1> if this uplink grant is received in a Random Access Response (i.e. in a MAC RAR or fallback RAR), or addressed to Temporary C-RNTI, or is determined as specified in clause 5.1.2a for the transmission of the MSGA payload:

2> consider this uplink grant as a prioritized uplink grant.

1> else if this uplink grant is addressed to CS-RNTI with NDI = 1 or C-RNTI:

2> if there is no overlapping PUSCH duration of a configured uplink grant which was not already de-prioritized, in the same BWP, whose priority is higher than the priority of the uplink grant; and

2> if there is no overlapping PUCCH resource with an SR transmission which was not already de-prioritized and the simultaneous transmission of the SR and the uplink grant is not allowed by configuration of *simultaneousPUCCH-PUSCH* or *simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup* or *simultaneousSR-PUSCH-diffPUCCH-Groups* or *simultaneousPUCCH-PUSCH-SamePriority* or *simultaneousPUCCH-PUSCH-SamePriority-SecondaryPUCCHgroup*, and the priority of the logical channel that triggered the SR is higher than the priority of the uplink grant:

3> consider this uplink grant as a prioritized uplink grant;

3> consider the other overlapping uplink grant(s), if any, as a de-prioritized uplink grant(s);

3> consider the other overlapping SR transmission(s), if any, as a de-prioritized SR transmission(s), except for the SR transmission(s) whose simultaneous transmission is allowed by configuration of *simultaneousPUCCH-PUSCH* or *simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup* or *simultaneousSR-PUSCH-diffPUCCH-Groups* or *simultaneousPUCCH-PUSCH-SamePriority* or *simultaneousPUCCH-PUSCH-SamePriority-SecondaryPUCCHgroup*;

3> if the de-prioritized uplink grant(s) is a configured uplink grant configured with *autonomousTx* whose PUSCH has already started:

4> stop the *configuredGrantTimer* for the corresponding HARQ process of the de-prioritized uplink grant(s);

4> stop the *cg-RetransmissionTimer* for the corresponding HARQ process of the de-prioritized uplink grant(s).

1> else if this uplink grant is a configured uplink grant:

2> if there is no overlapping PUSCH duration of another configured uplink grant which was not already de-prioritized, in the same BWP, whose priority is higher than the priority of the uplink grant; and

2> if there is no overlapping PUSCH duration of an uplink grant addressed to CS-RNTI with NDI = 1 or C-RNTI which was not already de-prioritized, in the same BWP, whose priority is higher than or equal to the priority of the uplink grant; and

2> if there is no overlapping PUCCH resource with an SR transmission which was not already de-prioritized and the simultaneous transmission of the SR and the uplink grant is not allowed by configuration of *simultaneousPUCCH-PUSCH* or *simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup* or *simultaneousSR-PUSCH-diffPUCCH-Groups* or *simultaneousPUCCH-PUSCH-SamePriority* or *simultaneousPUCCH-PUSCH-SamePriority-SecondaryPUCCHgroup*, and the priority of the logical channel that triggered the SR is higher than the priority of the uplink grant:

3> consider this uplink grant as a prioritized uplink grant;

3> consider the other overlapping uplink grant(s), if any, as a de-prioritized uplink grant(s);

3> if the de-prioritized uplink grant(s) is a configured uplink grant configured with *autonomousTx* whose PUSCH has already started:

4> stop the *configuredGrantTimer* for the corresponding HARQ process of the de-prioritized uplink grant(s);

4> stop the *cg-RetransmissionTimer* for the corresponding HARQ process of the de-prioritized uplink grant(s).

3> consider the other overlapping SR transmission(s), if any, as a de-prioritized SR transmission(s), except for the SR transmission(s) whose simultaneous transmission is allowed by configuration of *simultaneousPUCCH-PUSCH* or *simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup* or *simultaneousSR-PUSCH-diffPUCCH-Groups* or *simultaneousPUCCH-PUSCH-SamePriority* or *simultaneousPUCCH-PUSCH-SamePriority-SecondaryPUCCHgroup*.

NOTE 6: If the MAC entity is configured with *lch-basedPrioritization* and if there is overlapping PUSCH duration of at least two configured uplink grants whose priorities are equal, the prioritized uplink grant is determined by UE implementation.

NOTE 7: If the MAC entity is not configured with *lch-basedPrioritization* and if there is overlapping PUSCH duration of at least two configured uplink grants, it is up to UE implementation to choose one of the configured uplink grants.

NOTE 8: If the MAC entity is configured with *lch-basedPrioritization*, the MAC entity does not take UCI multiplexing according to the procedure specified in TS 38.213 [6] into account when determining whether the PUSCH duration of an uplink grant overlaps with the PUCCH resource for an SR transmission.

NOTE 9: For uplink spatial multiplexing, for the MAC entity configured with *lch-basedPrioritization*, the MAC entity considers the two uplink grants received on the PDCCH that schedules two TBs are prioritized or deprioritized together and the priority is determined by the highest priority among priorities of the logical channels that are multiplexed or have data available that can be multiplexed in the two MAC PDUs, according to the mapping restrictions as described in clause 5.4.3.1.2.

*END OF CHANGES*

*START OF CHANGES*

### 5.18.35 (Enhanced) LTM Cell Switch Command

The network may instruct the UE to perform LTM cell switch procedure by sending the LTM Cell Switch Command MAC CE described in clause 6.1.3.75 or the Enhanced LTM Cell Switch Command MAC CE described in clause 6.1.3.75a. The Enhanced LTM Cell Switch Command MAC CE is used for MAC entity associated with MCG if the value of *ltm-NoSecurityChangeID* contained within the *LTM-Candidate* associated with target configuration ID in *ltm-Config* is not equal to the value of stored *ltm-ServingCellNoSecurityChangeID* as specified in TS 38.331 [5]. Otherwise, the LTM Cell Switch MAC CE is used.

The MAC entity shall:

1> if the MAC entity receives an (Enhanced) LTM Cell Switch Command MAC CE on a Serving Cell:

2> indicate to upper layers that the LTM cell switch procedure is triggered and the Target Configuration ID included in the LTM Cell Switch Command MAC CE; or indicate to upper layers that the LTM cell switch procedure is triggered, the Target Configuration ID and the NCC value included in the Enhanced LTM Cell Switch Command MAC CE;

2> if the MAC reset operation as specified in clause 5.12 is performed, as requested by upper layers:

3> if Timing Advance Command value (hexa-decimal) is not set as FFF:

4> process the received Timing Advance Command (see clause 5.2);

4> consider the RACH-less LTM cell switch to be ongoing;

4> if the MAC entity is associated with the SCG:

5> indicate to upper layers to skip the Random Access procedure for this LTM cell switch.

3> else if the UE is configured with UE-based Timing Advance measurement as specified in TS 38.331 [5] and the UE has successfully measured the Timing Advance for the SpCell of the indicated LTM target configuration:

4> process the measured Timing Advance (see clause 5.2);

4> consider the RACH-less LTM cell switch to be ongoing.

4> if the MAC entity is associated with the SCG:

5> indicate to upper layers to skip the Random Access procedure for this LTM cell switch.

3> if the SR Configuration Resource ID is included in the (Enhanced) LTM Cell Switch Command MAC CE:

4> consider the associated physical layer resources on PUCCH related to the received SR Configuration Resource ID as the physical layer resources on where the UE may send the scheduling request for the first PUSCH transmission of a RACH-less LTM cell switch procedure (see clause 5.4.4);

3> indicate to lower layers the information regarding the TCI state information included in the LTM Cell Switch Command MAC CE or the Enhanced LTM Cell Switch Command MAC CE.

*END OF CHANGES*

*START OF CHANGES*

#### 6.1.3.75 LTM Cell Switch Command MAC CE

The LTM Cell Switch Command MAC CE is identified by MAC subheader with eLCID as specified in Table 6.2.1-1b. It has a variable size with following fields (Figure 6.1.3.75-1):

- R: Reserved bit, set to 0;

- Target Configuration ID: This field indicates the index of candidate target configuration to apply for LTM cell switch, corresponding to *ltm-CandidateId* minus 1as specified in TS 38.331 [5]. The length of the field is 3 bits;

- Timing Advance Command: This field indicates whether the TA is valid for the LTM target cell (i.e. the SpCell corresponding to the target configuration indicated by Target Configuration ID field). If the value of this field is set to FFF, this field indicates that no valid timing adjustment is available for the PTAG of the LTM target cell; otherwise, this field indicates the index value *TA* used to control the amount of timing adjustment that the MAC entity has to apply in TS 38.213 [6], and that the UE can skip the Random Access procedure for this LTM cell switch. If *tag-Id-ptr* is configured for the TCI state indicated by the UL TCI state ID field, if present, or by the TCI state ID field otherwise, in the LTM target cell and *tag-Id-ptr* is set to value *n1*, this field indicates the TA for the TAG indicated by the *tag2-Id* of the LTM target cell; otherwise, this field indicates the TA for the TAG indicated by the *tag-id* of the LTM target cell. The length of the field is 12 bits;

- TCI state ID: This field indicates and activates the TCI state for the LTM target cell (i.e. the SpCell of the target configuration indicated by the Target Configuration ID field). The TCI state is identified by *TCI-StateId* in *ltm-DL-OrJointTCI-StateToAddModList* as specified in TS 38.331 [5]. If the value of *unifiedTCI-StateType* in the *ltm-TCI-Info* of the configuration indicated by Target Configuration ID fieldis *joint*, this field is for joint TCI state, otherwise, this field is for downlink TCI state. The length of the field is 7 bits;

- UL TCI state ID: This field indicates and activates the uplink TCI state for the LTM target cell (i.e. the SpCell of the target configuration indicated by the Target Configuration ID field). The UL TCI state is identified by *TCI-UL-StateId* in *ltm-UL-TCI-StateToAddModList* as specified in TS 38.331 [5]. The octet containing this field (i.e. this field and the two reserved bits in the same octet) is included if the value of *unifiedTCI-StateType* in the *ltm-TCI-Info* of the configuration indicated by Target Configuration ID fieldis *separate*. The length of the field is 6 bits;

- C: This field indicates the presence of the contention-free Random Access Resources fields. If the value of this field is set to 1, the following fields are present: Random Access Preamble index field, S/U field, SS/PBCH index field, PRACH Mask index field, Repetition number field and the reserved bits in the same octet. If the value of this field is set to 0, these fields are absent.

- S/U: This field indicates which UL carrier to transmit the PRACH of the contention-free Random Access Resources. If the value of this field is set to 1, SUL is used; otherwise, NUL is used. The length of the field is 1 bit;

- Random Access Preamble index: This field indicates the Random Access Preamble index of the contention-free Random Access Resources. This field should not be set to 0b000000. The length of the field is 6 bits;

- SS/PBCH index: This field indicates the SS/PBCH that shall be used to determine the RACH occasion for the PRACH transmission of the contention-free Random Access Resources. The length of the field is 6 bits;

- PRACH Mask index: This field indicates the RACH occasion(s) associated with the SS/PBCH indicated by 'SS/PBCH index' for the PRACH transmission of the contention-free Random Access Resources. It indicates a subset of RACH occasion(s) from the *rach-ConfigDedicated* for the UL carrier (indicated by S/U field), (if provided, otherwise it indicates a subset of RACH occasion(s) from the *rach-ConfigCommon* for the UL carrier (indicated by S/U field) in the UL BWP configuration of *firstActiveUplinkBWP-Id* as specified in TS 38.331 [5]. When the repetition number field is not set to 0, the UE ignores this field. The length of the field is 4 bits;

- Repetition number: This field indicates the Msg1 repetition number to be applied to the contention-free Random Access. If this field is set to 0, Msg1 repetition number does not apply. If this field is set to 1, the Msg1 repetition number is 2. If this field is set to 2, the Msg1 repetition number is 4. If this field is set to 3, the Msg1 repetition number is 8. The length of the field is 2 bits.NOTE 1: A non-zero Msg1 repetition number value may only be included in the LTM Cell Switch Command MAC CE when the LTM target cell configuration has contention-based Random Access Resources with a *FeatureCombinationPreambles* with the same Msg1 repetition number value and *featureCombination* indicating only *msg1-Repetitions*;

- S: This field indicates the presence of the SR configuration resource index field. If the value of this field is set to 1 the field SR Configuration Resource ID is present, otherwise (if the field is set to 0) the field is absent;

- SR Configuration Resource ID: This field indicates the SR configuration resources to be used according to the indicated SR configuration index. The SR configuration index is identified by *schedulingRequestResourceId* within *ltm-SchedulingRequestResources* as specified in TS 38.331 [5]. The length of the field is 3 bits.



Figure 6.1.3.75-1: LTM Cell Switch Command MAC CE



Figure 6.1.3.75-2: Extended LTM Cell Switch Command MAC CE

NOTE 2: If UE receives the LTM Cell Switch Command MAC CE with a Target Configuration ID value not matching any configured *ltm-CandidateId* minus 1, as specified in TS 38.331 [5], the procedure of handling LTM Cell Switch Command MAC CE in clause 5.18.35 does not apply.

#### 6.1.3.75a Enhanced LTM Cell Switch Command MAC CE

The Enhanced LTM Cell Switch Command MAC CE is identified by MAC subheader with eLCID as specified in Table 6.2.1-1b. It has a variable size with following fields (Figure 6.1.3.75a-1):

- R: Reserved bit, set to 0;

- Target Configuration ID: This field indicates the index of candidate target configuration to apply for LTM cell switch, corresponding to *ltm-CandidateId* minus 1as specified in TS 38.331 [5]. The length of the field is 3 bits;

- Timing Advance Command: This field indicates whether the TA is valid for the LTM target cell (i.e. the SpCell corresponding to the target configuration indicated by Target Configuration ID field). If the value of this field is set to FFF, this field indicates that no valid timing adjustment is available for the PTAG of the LTM target cell; otherwise, this field indicates the index value *TA* used to control the amount of timing adjustment that the MAC entity has to apply in TS 38.213 [6], and that the UE can skip the Random Access procedure for this LTM cell switch. If *tag-Id-ptr* is configured for the TCI state indicated by the UL TCI state ID field, if present, or by the TCI state ID field otherwise, in the LTM target cell and *tag-Id-ptr* is set to value *n1*, this field indicates the TA for the TAG indicated by the *tag2-Id* of the LTM target cell; otherwise, this field indicates the TA for the TAG indicated by the *tag-id* of the LTM target cell. The length of the field is 12 bits;

- TCI state ID: This field indicates and activates the TCI state for the LTM target cell (i.e. the SpCell of the target configuration indicated by the Target Configuration ID field). The TCI state is identified by *TCI-StateId* in *ltm-DL-OrJointTCI-StateToAddModList* as specified in TS 38.331 [5]. If the value of *unifiedTCI-StateType* in the *ltm-TCI-Info* of the configuration indicated by Target Configuration ID fieldis *joint*, this field is for joint TCI state, otherwise, this field is for downlink TCI state. The length of the field is 7 bits;

- UL TCI state ID: This field indicates and activates the uplink TCI state for the LTM target cell (i.e. the SpCell of the target configuration indicated by the Target Configuration ID field). The UL TCI state is identified by *TCI-UL-StateId* in *ltm-UL-TCI-StateToAddModList* as specified in TS 38.331 [5]. The octet containing this field (i.e. this field and the two reserved bits in the same octet) is included if the value of *unifiedTCI-StateType* in the *ltm-TCI-Info* of the configuration indicated by Target Configuration ID fieldis *separate*. The length of the field is 6 bits;

- C: This field indicates the presence of the contention-free Random Access Resources fields. If the value of this field is set to 1, the following fields are present: Random Access Preamble index field, S/U field, SS/PBCH index field, PRACH Mask index field, Repetition number field. If the value of this field is set to 0, the Random Access Preamble index field, S/U field, SS/PBCH index field, PRACH Mask index field, Repetition number field are absent, and the corresponding bits for S/U field and Repetition number field are reserved.

- NCC value: This field indicates the NCC value used to update the KgNB key. The NCC value is identified by *NextHopChainingCount* as specified in TS 38.331 [5]. The length of the field is 3 bits.

- S/U: This field indicates which UL carrier to transmit the PRACH of the contention-free Random Access Resources. If the value of this field is set to 1, SUL is used; otherwise, NUL is used. The length of the field is 1 bit;

- Random Access Preamble index: This field indicates the Random Access Preamble index of the contention-free Random Access Resources. This field should not be set to 0b000000. The length of the field is 6 bits;

- SS/PBCH index: This field indicates the SS/PBCH that shall be used to determine the RACH occasion for the PRACH transmission of the contention-free Random Access Resources. The length of the field is 6 bits;

- PRACH Mask index: This field indicates the RACH occasion(s) associated with the SS/PBCH indicated by ‘SS/PBCH index’ for the PRACH transmission of the contention-free Random Access Resources. It indicates a subset of RACH occasion(s) from the *rach-ConfigDedicated* for the UL carrier (indicated by S/U field), (if provided, otherwise it indicates a subset of RACH occasion(s) from the *rach-ConfigCommon* for the UL carrier (indicated by S/U field) in the UL BWP configuration of *firstActiveUplinkBWP-Id* as specified in TS 38.331 [5]. When the repetition number field is not set to 0, the UE ignores this field. The length of the field is 4 bits;

- Repetition number: This field indicates the Msg1 repetition number to be applied to the contention-free Random Access. If this field is set to 0, Msg1 repetition number does not apply. If this field is set to 1, the Msg1 repetition number is 2. If this field is set to 2, the Msg1 repetition number is 4. If this field is set to 3, the Msg1 repetition number is 8. The length of the field is 2 bits;

- S: This field indicates the presence of the SR configuration resource index field. If the value of this field is set to 1 the field SR Configuration Resource ID is present, otherwise (if the field is set to 0) the field is absent;

- SR Configuration Resource ID: This field indicates the SR configuration resources to be used according to the indicated SR configuration index. The SR configuration index is identified by *schedulingRequestResourceId* within *ltm-SchedulingRequestResources* as specified in TS 38.331 [5]. The length of the field is 3 bits.

NOTE 1: A non-zero Msg1 repetition number value may only be included in the Enhanced LTM Cell Switch Command MAC CE when the LTM target cell configuration has contention-based Random Access Resources with a *FeatureCombinationPreambles* with the same Msg1 repetition number value and *featureCombination* indicating only *msg1-Repetitions*.



Figure 6.1.3.75a-1: Enhanced LTM Cell Switch Command MAC CE

NOTE 2: If UE receives the Enhanced LTM Cell Switch Command MAC CE with a Target Configuration ID value not matching any configured *ltm-CandidateId* minus 1, as specified in TS 38.331 [5], the procedure of handling Enhanced LTM Cell Switch Command MAC CE in clause 5.18.35 does not apply.

*END OF CHANGES*