### 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. 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.

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 initial 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 initial transmission of RACH-less handover or for its retransmission (i.e., retransmission for initial RACH-less handover transmission); 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 initial 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*, apply the value of *additionalPriority*, if configured, as the priority for the logical channel for which the running PDCP *discardTimer* of an PDCP SDU of the logical channel that is multiplexed (i.e. the MAC PDU to transmit is already stored in the HARQ buffer) or can be multiplexed (i.e. the MAC PDU to transmit is not stored in the HARQ buffer) in the MAC PDU has the remaining value below *priorityAdjustmentThreshold*.

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.

#### 5.4.3.1 Logical Channel Prioritization

##### 5.4.3.1.1 General

The Logical Channel Prioritization (LCP) procedure is applied whenever a new transmission is performed.

RRC controls the scheduling of uplink data by signalling for each logical channel per MAC entity:

- *priority* where an increasing priority value indicates a lower priority level;

- *prioritisedBitRate* which sets the Prioritized Bit Rate (PBR);

- *bucketSizeDuration* which sets the Bucket Size Duration (BSD).

RRC additionally controls the LCP procedure by configuring mapping restrictions for each logical channel:

- *allowedSCS-List* which sets the allowed Subcarrier Spacing(s) for transmission;

- *maxPUSCH-Duration* which sets the maximum PUSCH duration allowed for transmission;

- *configuredGrantType1Allowed* which sets whether a configured grant Type 1 can be used for transmission;

- *allowedServingCells* which sets the allowed cell(s) for transmission;

- *allowedCG-List* which sets the allowed configured grant(s) for transmission;

- *allowedPHY-PriorityIndex* which sets the allowed PHY priority index(es) of a dynamic grant for transmission;

- *allowedHARQ-mode* which sets the allowed UL HARQ mode for transmission.

The following UE variable is used for the Logical channel prioritization procedure:

- *Bj* which is maintained for each logical channel *j*.

The MAC entity shall initialize *Bj* of the logical channel to zero when the logical channel is established.

For each logical channel *j*, the MAC entity shall:

1> increment *Bj* by the product PBR × T before every instance of the LCP procedure, where T is the time elapsed since *Bj* was last incremented;

1> if the value of *Bj* is greater than the bucket size (i.e. PBR × BSD):

2> set *Bj* to the bucket size.

NOTE: The exact moment(s) when the UE updates *Bj* between LCP procedures is up to UE implementation, as long as *Bj* is up to date at the time when a grant is processed by LCP.

##### 5.4.3.1.2 Selection of logical channels

The MAC entity shall, when a new transmission is performed:

1> select the logical channels for each UL grant that satisfy all the following conditions:

2> the set of allowed Subcarrier Spacing index values in *allowedSCS-List*, if configured, includes the Subcarrier Spacing index associated to the UL grant; and

2> *maxPUSCH-Duration*, if configured, is larger than or equal to the PUSCH transmission duration associated to the UL grant; and

2> *configuredGrantType1Allowed*, if configured, is set to *true* in case the UL grant is a Configured Grant Type 1; and

2> *allowedServingCells*, if configured, includes the Cell information associated to the UL grant. Does not apply to logical channels associated with a DRB configured with PDCP duplication within the same MAC entity (i.e. CA duplication) when CA duplication is deactivated for this DRB in this MAC entity; and

2> *allowedCG-List*, if configured, includes the configured grant index associated to the UL grant; and

2> *allowedPHY-PriorityIndex*, if configured, includes the priority index (as specified in clause 9 of TS 38.213 [6]) associated to the dynamic UL grant; and

2> *allowedHARQ-mode*, if configured, includes the allowed UL HARQ mode for the HARQ process associated to the UL grant.

NOTE: The Subcarrier Spacing index, PUSCH transmission duration, Cell information, and priority index are included in Uplink transmission information received from lower layers for the corresponding scheduled uplink transmission.

##### 5.4.3.1.3 Allocation of resources

Before the successful completion of the Random Access procedure initiated for DAPS handover, the target MAC entity shall not select the logical channel(s) corresponding to non-DAPS DRB(s) for the uplink grant received in a Random Access Response or the uplink grant for the transmission of the MSGA payload. The source MAC entity shall select only the logical channel(s) corresponding to DAPS DRB(s) during DAPS handover.

The MAC entity shall, when a new transmission is performed:

1> allocate resources to the logical channels as follows:

2> if *priorityAdjustmentThreshold* is configured for any logical channel:

3> adjust priority of the logical channel according to Clause 5.4.3.1.4 for this LCP procedure.

2> logical channels selected in clause 5.4.3.1.2 for the UL grant with *Bj* > 0 are allocated resources in a decreasing priority order. If the PBR of a logical channel is set to *infinity*, the MAC entity shall allocate resources for all the data that is available for transmission on the logical channel before meeting the PBR of the lower priority logical channel(s);

2> decrement *Bj* by the total size of MAC SDUs served to logical channel *j* above;

2> if *priorityAdjustmentThreshold* is configured for any logical channel and the UE supports *lch-PriorityAdjustmentRound2*:

3> adjust priority of the logical channel according to Clause 5.4.3.1.4 for this LCP procedure.

2> if any resources remain, all the logical channels selected in clause 5.4.3.1.2 are served in a strict decreasing priority order (regardless of the value of *Bj*) until either the data for that logical channel or the UL grant is exhausted, whichever comes first. Logical channels configured with equal priority should be served equally.

NOTE 1: The value of *Bj* can be negative.

If the MAC entity is requested to simultaneously transmit multiple MAC PDUs, or if the MAC entity receives the multiple UL grants within one or more coinciding PDCCH occasions (i.e. on different Serving Cells), it is up to UE implementation in which order the grants are processed.

The UE shall also follow the rules below during the scheduling procedures above:

- the UE should not segment an RLC SDU (or partially transmitted SDU or retransmitted RLC PDU) if the whole SDU (or partially transmitted SDU or retransmitted RLC PDU) fits into the remaining resources of the associated MAC entity;

- if the UE segments an RLC SDU from the logical channel, it shall maximize the size of the segment to fill the grant of the associated MAC entity as much as possible;

- the UE should maximise the transmission of data;

- if the MAC entity is given a UL grant size that is equal to or larger than 8 bytes (when eLCID is not used) or 10 bytes (when eLCID is used) while having data available and allowed (according to clause 5.4.3.1) for transmission, the MAC entity shall not transmit only padding BSR and/or padding.

The MAC entity shall:

1> if the MAC entity is configured with *enhancedSkipUplinkTxDynamic* with value *true* and the grant indicated to the HARQ entity was addressed to a C-RNTI, or if the MAC entity is configured with *enhancedSkipUplinkTxConfigured* with value *true* and the grant indicated to the HARQ entity is a configured uplink grant:

2> if there is no UCI to be multiplexed on this PUSCH transmission as specified in TS 38.213 [6]; and

2> if there is no aperiodic CSI requested for this PUSCH transmission as specified in TS 38.212 [9]; and

2> if the MAC PDU includes zero MAC SDUs; and

2> if the MAC PDU includes only the periodic BSR and there is no data available for any LCG, or the MAC PDU includes only the padding BSR:

3> not generate a MAC PDU for the HARQ entity.

1> else if the MAC entity is configured with *skipUplinkTxDynamic* with value *true* and the grant indicated to the HARQ entity was addressed to a C-RNTI, or the grant indicated to the HARQ entity is a configured uplink grant:

2> if there is no aperiodic CSI requested for this PUSCH transmission as specified in TS 38.212 [9]; and

2> if the MAC PDU includes zero MAC SDUs; and

2> if the MAC PDU includes only the periodic BSR and there is no data available for any LCG, or the MAC PDU includes only the padding BSR:

3> not generate a MAC PDU for the HARQ entity.

Logical channels shall be prioritised in accordance with the following order (highest priority listed first):

- MAC CE for C-RNTI, or data from UL-CCCH;

- MAC CE for (Enhanced) BFR, or MAC CE for Configured Grant Confirmation, or MAC CE for Multiple Entry Configured Grant Confirmation;

- MAC CE for Sidelink Configured Grant Confirmation;

- MAC CE for LBT failure;

- MAC CE for SL LBT failure according to clause 5.31.2;

- MAC CE for Timing Advance Report;

- MAC CE for Delay Status Report;

- MAC CE for SL-BSR prioritized according to clause 5.22.1.6;

- MAC CE for SL-PRS Resource Request;

- MAC CE for (Extended) BSR, with exception of BSR included for padding;

- MAC CE for (Enhanced) Single Entry PHR, or MAC CE for (Enhanced) Multiple Entry PHR or MAC CE for Single Entry PHR with assumed PUSCH, or MAC CE for Multiple Entry PHR with assumed PUSCH, or MAC CE for Enhanced Single Entry PHR for multiple TRP or MAC CE for Enhanced Multiple Entry PHR for multiple TRP, or MAC CE for Enhanced Single Entry PHR for multiple TRP STx2P or MAC CE for Enhanced Multiple Entry PHR for multiple TRP STx2P;

- MAC CE for Positioning Measurement Gap Activation/Deactivation Request;

- MAC CE for the number of Desired Guard Symbols;

- MAC CE for Case-6 Timing Request;

- MAC CE for (Extended) Pre-emptive BSR;

- MAC CE for SL-BSR, with exception of SL-BSR prioritized according to clause 5.22.1.6 and SL-BSR included for padding;

- MAC CE for IAB-MT Recommended Beam Indication, or MAC CE for Desired IAB-MT PSD range, or MAC CE for Desired DL Tx Power Adjustment;

- data from any Logical Channel, except data from UL-CCCH;

- MAC CE for Recommended bit rate query;

- MAC CE for BSR included for padding;

- MAC CE for SL-BSR included for padding.

NOTE 2: Prioritization among MAC CEs of same priority is up to UE implementation.

The MAC entity shall prioritize any MAC CE listed in a higher order than 'data from any Logical Channel, except data from UL-CCCH' over NR sidelink transmission.

##### 5.4.3.1.4 Priority adjustment for logical channel

The MAC entity shall:

1> if the smallest remaining value of the running PDCP *discardTimers* associated with the data, evaluated at the time of the first symbol of this new transmission, is below *priorityAdjustmentThreshold* for this logical channel:

2> apply *additionalPriority* instead of *priority* of this logical channel during this allocation of resources.

1> else:

2> use the *priority* for the logical channel.