3GPP TSG-RAN WG2 Meeting #125 R2-xxxxxx

Athens, Greece, 26 February – 1 March 2024

**Agenda item: X.X.X**

**Source: Apple**

**Title: Text Proposal for Invalid and Unused CG PUSCHs**

**WID/SID: NR\_XR\_enh-Core**

**Document for: Discussion / Decision**

# Discussions

In the current modeling of condition checking for invalid and unused CG PUSCHs in the draft CR of TS 38.321, a new term “available for use” is defined to cover these cases in Clause 5.8.2:

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| --- |
| A configured uplink grant is available for use:   1. if it is associated with a multi-PUSCH configured grant:   2> if it has not been indicated by the MAC entity to the lower layers as to be unused for PUSCH transmission; and  2> it does not meet the invalidality conditions specified in the clause 6.1 in TS 38.214 [7];   1. else:   2> if it has not been indicated by the MAC entity to the lower layers as to be unused for PUSCH transmission. |

From readability point of view, we think it may be a bit cumbersome as the reader of this specification needs to look at two different clauses (5.4.1 and 5.8.2) in order to understand whether a configured grant PUSCH can be further processed by the MAC entity and HARQ entity. Moreover, the word “available” seems to be used in multiple different places of TS 38.321 to describe an uplink grant or a UL-SCH resource, with slightly different meanings. This may potentially lead to some confusions. Thus, we propose to specify and integrate the condition checking for invalid and unused CG PUSCH as a part of the procedure of configured grant reception in Clause 5.4.1, as shown in the Annex.

We think the text proposal in the Annex provides the following advantages as compared to the current modeling in the CR:

* The condition checking for invalid and unused CGs are merged into the procedure of UL CG reception, which improves the readability.
* The new term “available for use” is not needed.
* The amount of additional text required by specification change can be reduced (e.g. there is no need to repeat the description of “unused PUSCH” for both multi-PUSCH and single-PUSCH cases)

**Proposal: Adopt the Text Proposal in the Annex in the MAC CR for Rel-18 XR.**

# Annex: Text Proposal

*Start of the Change*

### 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.

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> 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> 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, 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> if the configured uplink grant is associated to a multi-PUSCH configured grant, and it is considered invalid based on the conditions specified in the clause 6.1 in TS 38.214 [7]; or

2> if the configured uplink grant has been indicated by the MAC entity to the lower layers as unused for PUSCH transmission:

3> ignore the configured uplink grant.

2> else:

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

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

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

4> if there is no on-going CG-SDT procedure:

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

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

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

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

5> consider the NDI bit to have been toggled;

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

4> 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):

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

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

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

4> 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):

5> consider the NDI bit to have been toggled;

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

4> else 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; and

4> if PDCCH addressed to the MAC entity's C-RNTI has not been received (i.e., retransmission for initial CG-SDT transmission):

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

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

*End of the Change*