3GPP TSG-RAN WG2 Meeting #110\_e R2-20xxxxx

Electronic meeting, 1st – 12th June 2020

Agenda Item: 6.2.1

Source: Ericsson (rapporteur)

Title: [Post109bis-e][935]][NR-U] MAC open issues (Ericsson)

Document for: Discussion, Decision

# Introduction

This document shall be used to capture open issues and identify new issues in the following email discussion:

* [Post109bis-e][935]][NR-U] MAC open issues (Ericsson)

Address stage-3 remaining open issues from 109e. Capture identified NEW, if any, stage-3 corrections/issues from other companies.  Issues that have already been discussed and not pursued should not be brought up again.

      Intended outcome: CR for 38.321 addressing open issues (including editorials received offline)

      Deadline: Next Meeting

In order to allow all companies to comment on any new issues, please bring up any new issues before Monday May 18th 23.59 PST.

First we have section 2 that can be used for entering NEW issues, note that issues that have already been discussed and not pursued should not be brought up again. Please add any new issues in section 2.

Then we will have text proposals in section 3 (or in a CR) and a summary in section 4.

# Open issues

## LS to RAN2 on clarification of RVID for the first transmission for CG-PUSCH

At RAN2#109\_e RAN2 made the following agreement on redundancy versions:

1. The UE uses RV zero for the initial transmission. The RV selection for auto-retransmission is left up to UE implementation, as for feLAA.

RAN2 received questions from RAN1 in the LS [R2-2004359](https://www.3gpp.org/ftp/tsg_ran/wg2_rl2/TSGR2_110-e/LSin/R2-2004359.zip), where they state problems of understanding and implementing this agreement when repetitions are configured. RAN1 asks RAN2 to change the agreement and leave the selection of redundancy version to the UE implementation.

* Q1: Was this RAN2 agreement made by also accounting for the case when parameters *cg-nrofSlots-r16* and *cg-nrofPUSCH-InSlot-r16* are configured and *repK*>1? In that case, does this agreement enforce the first transmission out of *repK* from using RV0? RAN1 finds some difficulties to implement this at least for short CG-PUSCHs.
* Q2: In general, given that the CG-UCI includes information related to the RVID of the current CG-PUSCH, is it possible to leave the choice of RVID up to the UE implementation? Keep in mind, that 1) a reasonable UE implementation will not intentionally choose an RVID that would worsen performances, and 2) fixing for the initial transmission RV to 0 does not help gNB’s implementation, since gNB is still unaware of when the initial transmission would happen. In fact, the gNB needs to perform blind detection to determine the CG-PUSCH location, and attempt to decode CG-UCI before decoding the CG-PUSCH.
* Q3: Is it possible from RAN2 perspective to remove the text in square brackets in the above TP and leave the choice of RVID completely up to UE when *cg-RetransmissionTimer* is provided?

**Question 2.1a: Do you agree to change the agreement and let UE implementation select the redundancy version when *cg-RetransmissionTimer* is configured?**

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| **Company** | **Reply (yes/no)** | **Additional comments** |
| OPPO | No | We think for the case when rep-K = 1, i.e., no repetition case, we see no reason to revert the agreement, i.e., initial transmission use RV=0. However, when rep-k>1, there was a concern from RAN1 that the UE may not be able to change the RVs if the initial transmission fails due to LBT, then we think it’s up to UE implementation to select any RVs, however, it should be noted that at least there should be a transmission using RV=0 in the bundle otherwise it might have issue for the network to decode the bundle. |
| Qualcomm | Yes | As explained in the RAN1 LS, the RV=0 selection for the first transmission does not help gNB implementation and the intention was to simplify the specification and have a uniform text for both CG and repK. If the concern is that some bad UE implementation does not use RV=0 for the first transmission, this can be captured in the Chair Notes, e.g. “RAN2 assumes that the UE implementation will select RV=0 for the first transmission”. |
| Huawei | Yes | We think the rationale for doing this is reasonable that even for the initial transmision, there is no strict need to restrict the RV to 0 and the RV can always be indicate to the network with UCI. |
| Intel | Yes | Typically, the packet for the different repetitions of a transmission is pre-generated with the respective RV. To achieve the best coding gain, the UE transmits the repetitions of a transmission with RVid ordered as 0/2/3/1. If the first transmission is always needed to be set to rvid = 0 as per the current RAN2 agreement and the first repetition (Rep#0) fails LBT, the UE will have to regenerate the packet for the 2nd repetition (Rep#1) if UE is forced to use rvid=0 for the first transmission (i.e. 2nd repetition).  This may creates unnecessary implementation processing for the UE and does not add to performance gain by doing so since the gNB will not have received the transmission from Rep#0 as mentioned in the LS. RAN2 has agreed to leave RV selection for auto-retransmission to UE implementation, it would seem that the RV for the first transmission can also be left to the UE implementation.  Also it would seem to simplify RAN1 specification if repK=1 and repK>1 are aligned. If the concern is bad UE implementation, as said in the LS, a reasonable UE implementation will not intentionally choose an RVID that would worsen performances. |
| ZTE | Yes | Yes, given that UCI explicitly indicates the RV, it is okay to leave it to UE implementation. If the concern is that RV0 may never be sent with this approach due to some bad implementation, then we are okay to capture this as a note as mentioned by QC. |
| Futurewei | Yes | It’s fine for network to rely on the received UCI to detect the RV transmitted by UE. |
| Nokia |  | RAN2 seemed to have different assumptions from RAN1. We agreed also the following NOTE which assumed the UE has no such difficulty to change the TB prepared for a first TTI to be sent on a second TTI. Intended behaviour should be correctly captured other than targeting for simplification of the specification.  *NOTE: When a single DCI is used to schedule multiple PUSCH, the UE is allowed to map generated TB(s) internally to different HARQ processes in case of LBT failure(s), i.e. UE may transmit a new TB on any HARQ process in the grants that have the same TBS, the same RV and the NDIs indicate new transmission.* |
| Lenovo | Yes | Since UCI indicates RV, there should be no problem to leave the RV selection to UE. Also from performance point of view we don’t see a big problem here. A reasonable UE implementation will not choose an RV intentionally for performance degradation. We could go with some Chairman note if this is majority view. It should be noted (as a response to Nokia’s comment) that for the multi-PUSCH case it’s only an implementation option to move the TB to a different HARQ process with same TBS and RV. Also for the multi-PUSCH case we talk about different HARQ processes in contrast to the repetition case, which may also make a difference from implementation point of view. |
| Samsung | Yes | We agree with all the proponents that network can decode TB based on the UCI even for the initial transmission. |
| LG | Yes | Considering that CG-UCI indicates the RV explicitly, we do not see problems to leave it to UE implementation to select the RV for all transmissions when *cg-RetransmissionTimer* is configured. |

**Question 2.1b: If answered “no” to question 2.1a, how do you propose solving the issues brought up by RAN1?**

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| **Company** | **Reply (yes/no)** | **Additional comments** |
| OPPO |  | For repK>1, UE implementation selects redundancy version for the bundle, RV=0 should be selected at least for one of the transmissions for the bundle. |
| Nokia |  | As commented in Q1, If no issue with UE implementation, the initial transmission of the TB should be with RV=0 regardless of which grant within the bundle is used. |

**Question 2.1c: Do you agree that RAN2 did not consider repK>1 when agreeing to use RV zero for the initial transmission?**

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| **Company** | **Reply (yes/no)** | **Additional comments** |
| OPPO | yes |  |
| Qualcomm | Yes | The discussion in RAN2 was only for CG with retransmission timer and repK > 1 was not considered. |
| Huawei | Yes |  |
| Intel | Yes |  |
| ZTE | Yes | This can be left to UE implementation |
| Futurewei | Yes |  |
| Nokia | Yes | But we do not see much difference than the logic for the NOTE about multiple TTI grant if the UE can do so. |
| Lenovo | Yes |  |
| Samsung | Yes |  |
| LG | Yes |  |

**Question 2.1d: Do you agree that if RAN2 answers “yes” to to question 2.1a, then that shall also solve the RAN1 issues mentioned in the LS Q1?**

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| **Company** | **Reply (yes/no)** | **Additional comments** |
| OPPO | No | It will not really solve the issue. |
| Qualcomm | Yes | As indicated in the LS, selection of RV = 0 for the first transmission in repK > 0 is problematic due to possible LBT failures where the UE will not be able to use the prepared TB in another slot. Therefore, RV=0 in the first transmission should not be mandated for repK > 1. In addition, we should not tie the answer to Q1 and Q2 together. Even if RAN2 decides to keep RV=0 mandate for CG with retransmission (i.e. No to Q2, Q3), the decision for repK > 0 (Q1) should be independent. RAN1’s main technical concern is for repK case in Q1. The request in Q2 and Q3 to simplify the specification for CG case. |
| Huawei | Yes | For Q1, we can answer directly to RAN1 that for repK, it follows the design for R15 and the above agreement in RAN2 has no impacts on that. For Q2, since RAN1 has expressed difficulty in implementing RV=0 for initial transmission, it is also OK from RAN2 perspective to select the RV for initial tranmsission by UCI indication. |
| Intel | Yes |  |
| ZTE |  | If RV0 is not fixed for the first transmission, there is no issue to solve. |
| Futurewei | Not really | Question 2.1a is only about RV selection when cg-RetransmissionTimer is configured. LS Q1 is more concerned with repetition case when repK > 0 is configured. RAN1’s concern seems to be more with “repK-RV” of Rel-15, which uses RV0 for the 1st transmission, in case LTB failure occurs on the first transmission of a bundle. |
| Nokia |  | Already captured in MAC specification RV = 0 for initial transmission for CG. Can add repetition case here as well.  e.g. : For configured uplink grants configured with *cg-RetransmissionTimer* and for repetitions for operation with shared spectrum channel access, the redundancy version zero is used for initial transmissions and UE implementation selects redundancy version for retransmissions. |
| Lenovo | Yes |  |
| Samsung | Yes |  |
| LG | Yes | Considering that CG-UCI indicates the RV explicitly, we do not see no problem with solving the RAN1 issue. |

# Text proposals

# Summary