**3GPP TSG RAN WG1 Meeting #104-e R1-210xxxx**

E-meeting, January 25th – February 5th, 2021

**Agenda item: 7.1**

**Source: Moderator (Ericsson)**

**Title:** **Moderator summary of Email discussion [104-e-NR-7.1CRs-14]**

Document for: Discussion and Decision

# Introduction

This document is intended to facilitate exchange of views and discussions for the following assigned email discussion by Mr. Chairman based on the draft CRs [1] and [2] for Rel-15 and Rel-16, respectively.

[104-e-NR-7.1CRs-14] Draft CR on Type-1 HARQ -ACK for PDSCH repetition with different SCSs in DL and UL – Sorour (Ericsson) by Jan 29

Summary of Draft CRs [1], [2]:

Issue: In Clause 9.1.2, TS 38.213, when reporting of Type-1 HARQ-ACK information for a PDSCH reception in case of repetition is described, the slots with PDSCH reception corresponding to a HARQ-ACK are determined from *slot* $n-N\_{PDSCH}^{repeat}+1$ to *slot n* where, *slot n* corresponds to the UL slot that is mapped to the last PDSCH reception (with or without repetition) and the time interval on UL for PDSCH reception is stated to be from *slot* $n-N\_{PDSCH}^{repeat}+1$ to *slot n*. Since the quantity for PDSCH aggregation factor (i.e. ) is measured in DL slot size, in case the SCS of carriers with corresponding PDSCH and PUCCH transmissions is different, it is not correct to state that the first PDSCH transmission is mapped to slot *slot* $n-N\_{PDSCH}^{repeat}+1$*.*

**Proposed change:** The PDSCH aggregation factor is scaled properly with respect to numerologies of PDSCH and PUCCH carriers to determine properly the UL slot that would include the first PDSCH reception.

# Discussions

In order to conclude this discussion, companies are encouraged to share their views on the questions below.

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| **Question1:** Do you agree with the issue and corresponding change discussed in the draft CRs technically? If No, why?**Question 2:** Can you consider implementing the CRs for Rel-15 and/or Rel-16? **Question 3 (in case No to Question 2):** Please share your preference on how to proceed, including potential updates of the draft CRs. |
| **Company** | **Comment** |
| Apple | Q1: we agree with the issue. For the draft CRs, we think the floor operation should be ceiling operation instead.Q2: we think this should be implemented in both Rel-15 and Rel-16. Even though the specification is not correct, the intention should be clear for UE implementation. |
| CATT | We agree with the issue and the intention of the CR and we agree that CRs are needed for both Rel-15 and Rel-16.We agree with Apple that ceiling operation instead of floor operation should be applied. In addition, it is suggested to clarify that *μ* corresponds to the numerology of the active BWP rather than the numerology of the carrier considering that UE can be configured with multiple BWPs within a carrier with different SCS configurations.For Rel-16, sub-slot is not considered for scaling in the draft Rel-16 CR and should be taken into account. |
| NTT DOCOMO | Q1: AgreeQ2: OK for at least Rel-16. For Rel-15, it might lead to NBC issue. If any company does not have concern, we are fine for Rel-15 as well. |
| Qualcomm | Q1: OK with having the CR for Rel-16 (with the change “floor => ceiling”). Q2: We prefer to limit the CR to Rel-16 since this may lead an NBC issue for Rel.15.  |
| Samsung | Q1: We agree with the issue, but prefer different CR version if necessity of CR is valid for all companies. Simply, proposed CR is not working in case in case where PDSCH SCS(e.g., 30kHz) is larger than PUCCH SCS (e.g., 15kHz). Simply, if N\_PDSCH^repeat = 1, it becomes “from slot n+1 to slot n”. Actually, since it is likely that DL SCS is larger/smaller than UL SCS and K1 is determined by the ending symbol of PDSCH instead of the ending symbol of the DL slot, we would like to suggest followings (one for Rel-15, the other for Rel-16)

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| **<TP 1 for Rel-15>**If the UE is provided *pdsch-AggregationFactor*,  is a value of *pdsch-AggregationFactor*; otherwise, . The UE reports HARQ-ACK information for a PDSCH reception from DL slot  to DL slot  only in a HARQ-ACK codebook that the UE includes in a PUCCH or PUSCH transmission in UL slot , where n is an UL slot overlapping with the end of the PDSCH reception in DL slot , and  is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ\_feedback timing indicator field is not present in the DCI format.**<TP 2 for Rel-16>**The UE reports HARQ-ACK information for a PDSCH reception- from DL slot $n-N\_{PDSCH}^{repeat}+1$ to DL slot $n$, if $N\_{PDSCH}^{repeat}$ is provided by *pdsch-AggregationFactor* or *pdsch-AggregationFactor-r16* [6, TS 38.214], or - from DL slot $n-repetitionNumber+1$ to DL slot $n$, if the time domain resource assignment field in the DCI format scheduling the PDSCH reception indicates an entry containing *repetitionNumber,* or - in DL slot $n$, otherwise only in a HARQ-ACK codebook that the UE includes in a PUCCH or PUSCH transmission in slot $n+k$, where n is an UL slot overlapping with the end of the PDSCH reception in DL slot  and $k$ is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ\_feedback timing indicator field is not present in the DCI format. If the UE reports HARQ-ACK information for the PDSCH reception in a slot other than slot $n+k$, the UE sets a value for each corresponding HARQ-ACK information bit to NACK.  |

Q2: Fine with at least for Rel-16 CR.  |
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# Conclusion

To be updated with the outcome of the email discussion.

# References

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| [1] | [**R1-2101722**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_104-e/Docs/R1-2101722.zip) | Draft CR on Type-1 HARQ-ACK for PDSCH repetition with different SCSs in DL and UL | Ericsson |
| [2] | [**R1-2101723**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_104-e/Docs/R1-2101723.zip) | Draft CR on Type-1 HARQ-ACK for PDSCH repetition with different SCSs in DL and UL | Ericsson |