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

**e-Meeting, January 25th – February 5th, 2021**

**Agenda item:** 7.1

**Source:** Moderator (CATT)

**Title:** Summary of [104-e-NR-7.1CRs-08] Correction on UCI multiplexing with PUCCH overriding

**Document for:** Discussion and Decision

# Introduction

This document is created to facilitate the email discussion of “[104-e-NR-7.1CRs-08] Correction on UCI multiplexing with PUCCH overriding”. This email thread is triggered by draft CR in [1]. The draft CR discussed two issues and companies are invited to provide views in section 2.

**Issue 1:**

If a PUCCH resource for HARQ-ACK overlaps with another PUCCH/PUSCH without associated DCI (e.g. PUCCH resource for CSI/SR, PUSCH for SP-CSI transmission or CG PUSCH), the PUCCH resource for HARQ-ACK may be overridden to a PUCCH resource which **does not** overlap with the PUCCH/PUSCH without associated DCI after UE determines to multiplex CSI/SR or CG PUSCH with HARQ-ACK. The UE behavior is not clear in this case. Detailed examples are provided in the cover page.

**Issue 2:**

PUCCH overriding timeline was defined to ensure that UE has enough time to know whether a PUCCH resource for HARQ-ACK is overridden, but the timeline does not include the case when the overridden PUCCH resource is for SPS HARQ-ACK.

# Company views

**Q1: Do you agree with issue 1 as introduced in section 1? If not, why?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not** | **Comment** |
| QC | Partially agree | We acknowledge this is an issue and the timeline was not defined when consider the interaction between UCI multiplexing and HARQ-ACK resource overriding. But we think the issue is not critical and does not qualify a Rel-15 CR at this stage. gNB can do scheduling properly to make sure the second DCI arrives early enough (to meet the timeline by consider all the three PUCCHs are “virtually” overlapping with each other) to avoid this issue. |
| NTT DOCOMO | Agree | As QC mentioned, NW side should do scheduling so that this situation does not occur. |
| Huawei, HiSilicon | Agree | It is sure that there is no specific consideration on UCI multiplexing along with PUCCH overriding in Rel-15 spec. However, the N3 timeline could cover most of cases and make the benefits to introduce another timeline is marginal, which only take effect when the SPS transmission leads to the first PUCCH. As comments of others, this can be handled by gNB implementation. |
| OPPO | Partially agree | It can be handled by gNB implementation |
| Samsung |  | We think that this is corner case, it should be avoided by gNB implementation. Actually, it is understood that this seem like a discussion about the interaction between cancellation and multiplexing that was extensively in Rel-15. It is noted that there was no conclusion on that issue. In this sense, we don’t see any necessity to handle this specific case, again. |
| Intel |  | We share similar view as other companies that this is a corner case and can be handled by gNB to avoid such issues, e.g., indicating same PUCCH resource for HARQ-ACK transmission. |
| Ericsson | No | There is a misunderstanding of the procedures.   * In overlapping procedures used in clause 9.2.5, the outcome of overriding procedures in 9.2.3 is used that is subject to overlapping with other resources in the slot. * However, in multiplexing timeline calculation, all the PDSCHs and DCIs involved in overriding are considered. |
| ZTE | Agree | We agree that this issue exists. In this case, the UE behavior cannot be anticipated if the timeline is not defined. We also think this issue can be handled by the gNB implementation. |
| Spreadtrum | Agree | Same comments as some companies, this issue is valid. However it can be handled by gNB. |
| vivo | Partially agree | We share similar view as other companies that this is a corner case and can be handled by gNB to avoid such issues. |

**Q2: Do you agree with the text proposal for TS 38.213 clause 9 in the draft CR [1]? If not, why?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not** | **Comment** |
| QC | No | As mentioned in answer to Q1, no TP is needed for this issue |
| NTT DOCOMO | No for Rel-15  OK for Rel-16 | NW side guarantees sufficient time, so system works. TP for Rel-15 is unnecessary.  TP for Rel-16 is OK for us. |
| Huawei, HiSilicon | NO for Rel-15  For Rel-16, it can be further discussed if necessary. | As comments in the Q1, introduction of a new timeline has limited befits. A modification of N3 definition could be a feasible way for Rel-16. |
| OPPO | No | gNB can guarantee processing time. |
| Samsung |  | No TP is preferred |
| Intel | No | As mentioned above, no TP is necessary. |
| Ericsson | No | No TP is needed. Due to the reason that mentioned above. We do not agree with the analysis that there is an issue. |
| ZTE | No for Rel-15  OK for Rel-16 | We agree it will make the UE behavior clear and bring more flexibility to the network scheduling if the timeline is defined. We are fine to discuss this in Rel-16. |
| Spreadtrum | No for Rel-15  Open for Rel-16 | We are open to discuss for Rel-16. |
| vivo | No | As mentioned in answer to Q1, it can be avoided by gNB. |

**Q3: Do you agree with issue 2 as introduced in section 1? If not, why?**

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| --- | --- | --- |
| **Company** | **Agree or not** | **Comment** |
| QC | Agree | Yes, N3 should cover HARQ-ACK for SPS as well. |
| NTT DOCOMO | Agree | As Q1, NW side should do scheduling so that this situation does not occur. |
| Huawei, HiSilicon | Agree | Ok to contain the SPS HARQ feedback. |
| OPPO | Agree | Yes, N3 should be applied for HARQ-ACK for SPS |
| Samsung | Agree | Fine to consider |
| Intel | Agree | We are fine for SPS HARQ-ACK |
| Ericsson | Agree | We are OK to consider. |
| ZTE | Agree | Yes, we think the HARQ-ACK for SPS should also be included. |
| Apple | Agree |  |
| Spreadtrum | Agree |  |
| vivo | Agree |  |

**Q4: Do you agree with the text proposal for TS 38.213 clause 9.2.3 in the draft CR [1]? If not, why?**

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| --- | --- | --- |
| **Company** | **Agree or not** | **Comment** |
| QC | Agree | We are OK with the TP for the second issue |
| NTT DOCOMO | No for Rel-15  OK for Rel-16 | Same comment as Q2 |
| Huawei, HiSilicon | NO for Rel-15.  Can apply to Rel-16. | No need to change Rel-15 UE implementation at such too late stage. Rel-16 spec could be updated accordingly. |
| OPPO | Agree | Fine TP for Rel-16 at least. |
| Samsung | Agree |  |
| Intel | Fine for Rel-16 | Fine for Rel-16 |
| Ericsson | Agree | Fine with TP on second issue. From our perspective it is OK to consider it for both Rel-15 and Rel16. |
| ZTE | Agree | We are fine with the TP for the issue 2. |
| Nokia | Agree | We are OK with at least a Rel-16 change, R15 can be considered as well. |
| Spreadtrum | Agree | We support this TP for Rel-15 and Rel-16. |
| vivo | Agree | If the gNB can guarantee the timeline, Rel-15 UE behavior may not be impacted. It can be considered for both Rel-15 and Rel-16. |

# Conclusion

To be added after the discussion.

# Reference

1. [R1-2100326](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_104-e/Docs/R1-2100326.zip) Correction on UCI multiplexing with PUCCH overriding CATT