**3GPP TSG RAN WG1 Meeting #106-e R1-210xxxx**

e-Meeting, Aug 16-27, 2021

**Agenda Item: 7.2.2**

**Source: Moderator (Huawei)**

**Title: Feature lead summary#1 on NR-U HARQ maintenance**

**Document for: Discussion and Decision**

# Introduction

Corrections on HARQ and multi-PUSCH scheduling for NRU have been submitted at RAN1#106 e-meeting.

Section 2 provides a summary of the proposed corrections, and the feature lead’s recommendation for discussion in the preparation phase.

# Preparation phase

The corrections proposed in 5 Tdocs to RAN1#106e are summarized in the table below.

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| **CR** | **CR summary** | **FL recommendation** |
| R1-2106508 | Correction on RRC parameter name of HARQ-ACK codebook in TS 38.2139.1.3.3 Type-2 HARQ-ACK codebook grouping and HARQ-ACK retransmission If a UE is provided *pdsch-HARQ-ACK-Codebook-r16*, the UE determines HARQ-ACK information for multiplexing in a PUCCH transmission occasion according to the following procedure. | Straightforward correction |
| R1-2107232 | Draft CR on e-type 2 HARQ codebook9.1.3.3 Type-2 HARQ-ACK codebook grouping and HARQ-ACK retransmission If a HARQ-ACK transmission for a given PDSCH group with a given value of NFI is requested, the UE does not expect to receive a DCI format scheduling the given PDSCH group with a different value of NFI before the ending of the HARQ-ACK transmission. | Discussion is needed for clarifying UE behaviour for error cases or specifying a new behaviour in case of NFI toggling for an unreported PDSCH group |
| R1-2107235 | ***Draft CR on PDSCH-to-HARQ feedback timing indicator field values*** 9.2.3 UE procedure for reporting HARQ-ACK <Unchanged part omitted>  For DCI format 1\_0, the PDSCH-to-HARQ\_feedback timing indicator field values map to {1, 2, 3, 4, 5, 6, 7, 8}. For a DCI format, other than DCI format 1\_0, scheduling a PDSCH reception or a SPS PDSCH release, or requesting Type-3 HARQ-ACK codebook report and does not schedule a PDSCH reception as described in Clause 9.1.4, the PDSCH-to-HARQ\_feedback timing indicator field values, if present, map to values for a set of number of slots provided by *dl-DataToUL-ACK*, *dl-DataToUL-ACK-r16*, or *dl-DataToUL-ACKForDCIFormat1\_2*, as defined in Table 9.2.3-1. | Straightforward correction |
| R1-2107695  R1-2107976 (not a CR) | ***Frequency hopping for multi-PUSCH scheduling with single DCI***  TS38.214 reads for both rel-15 and Rel-16: 6.3 UE PUSCH frequency hopping procedure […]  One of two frequency hopping modes can be configured:  - Intra-slot frequency hopping, applicable to single slot and multi-slot PUSCH transmission.  - Inter-slot frequency hopping, applicable to multi-slot PUSCH transmission.  R1-2107695 notes that it is not clear if PUSCH transmission due to multi-PUSCH scheduling by a single DCI is classified as "single-slot" or "multi-slot."  R1-2107695 proposes that only intra-slot frequency hopping applies to PUSCH transmissions scheduled with a single DCI:  - Intra-slot frequency hopping, applicable to single slot and multi-slot PUSCH transmission and multiple PUSCH transmissions scheduled by a DCI.  - Inter-slot frequency hopping, applicable to multi-slot PUSCH transmission.  R1-2107976 proposes to clarify that intra-slot frequency hopping is applicable to multi-PUSCH scheduling, while inter-slot frequency hopping is not applicable to multi-PUSCH scheduling. | Discuss to reach RAN1 common understanding on this issue.  The CR may need a clearer formulation maybe linking to the higher layer parameter *pusch-TimeDomainAllocationListForMultiPUSCH* |

# References

1. R1-2106508, Correction on RRC parameter name of HARQ-ACK codebook in TS37.213, Huawei, HiSilicon
2. R1-2107232, Draft CR on e-type 2 HARQ codebook, OPPO
3. R1-2107235, Draft CR on PDSCH-to-HARQ feedback timing indicator field values, OPPO
4. R1-2107695, Correction on frequency hopping for multi-PUSCH scheduling with single DCI, Ericsson Inc.
5. R1-2107976, Discussion on frequency hopping for multi-PUSCH scheduling, vivo