**3GPP TSG RAN WG1 #103-e R1-200xxxx**

**e-Meeting, October 26th – November 13th, 2020**

Source: moderator (vivo)

Title: Feature lead summary on NRU configured grant enhancement

Agenda Item: 7.2.2

Document for: Discussion and Decision

1. Introduction

In this contribution, contributions submitted in AI 7.2.2 are summarized. In section 2, the remaining issues raised in the contributions are listed.

1. Remaining issues
	1. Issue 1: clarification on HARQ-ACK multiplexing

TP from [1]

================== Start of TP for TS 38.213 ========================

9. UE procedure for reporting control information

===================== Unchanged Texts Omitted ========================

If a UE would multiplex HARQ-ACK information in a PUSCH transmission that is configured by a *ConfiguredGrantConfig*, and includes CG-UCI [5, TS 38.212], then

* ~~the UE multiplexes the HARQ-ACK information in the PUSCH transmission~~ if the UE is provided *cg-CG-UCI-Multiplexing,* the UE multiplexes the HARQ-ACK information in the PUSCH transmission;
* otherwise, the UE does not transmit the PUSCH and multiplexes the HARQ-ACK information in a PUCCH transmission or in another PUSCH transmission.

======================= Unchanged Texts Omitted ==========================

======================= End of TP for TS 38.213 =======================

* 1. Issue 2: HARQ-ACK feedback in CG-DFI for dynamic grant PUSCH

TPs from [1], [2], [3], [5]

-------------------------**Text proposal #1 starts for TS 38.213** ----------------------------

10.5 HARQ-ACK information for PUSCH transmissions

================== Unchanged Texts Omitted ================

For an initial transmission by a UE of a transport block in a PUSCH configured by *ConfiguredGrantConfig*, if the UE receives a CG-DFI that provides HARQ-ACK information for the transport block, the UE assumes that the transport block was correctly decoded if the HARQ-ACK information value is ACK; otherwise, the UE assumes that the transport block was not correctly decoded.

(Option1) For a PUSCH transmission scheduled by a DCI format, if the UE receives a CG-DFI that provides HARQ-ACK information for the transport block, the UE assumes that the transport block was correctly decoded if the HARQ-ACK information value is ACK; otherwise, the UE assumes that the transport block was not correctly decoded.

(Option 2) For a PUSCH transmission scheduled for a slot by a DCI format, if a UE is provided *PUSCH-CodeBlockGroupTransmission* for a serving cell, a value of HARQ-ACK information for a transport block of a corresponding HARQ process number is ACK if at least 10% of all the CBGs of PUSCH(s) scheduled by any DCI format in the same slot was correctly decoded; otherwise, a value of HARQ-ACK information is NACK.

For a PUSCH transmission scheduled by a DCI format, HARQ-ACK information for a transport block of a corresponding HARQ process number is valid if a first symbol of the PDCCH reception is after a last symbol of the PUSCH transmission by a number of symbols provided by *cg-minDFIDelay-r16* or, if the PUSCH transmission is over multiple slots,

- after a last symbol of the PUSCH transmission in a first slot from the multiple slots by a number of symbols provided by *cg-minDFIDelay-r16*, if a value of the HARQ-ACK information is ACK.

- after a last symbol of the PUSCH transmission in a last slot from the multiple slots by a number of symbols provided by *cg-minDFIDelay-r16*, if a value of the HARQ-ACK information is NACK.

<Unchanged Text Omitted>

------------------------- **Text proposal #1 ends for TS 38.213** -------------------------------

* 1. Issue 3: on beta offset

TPs from [2]

Agree on following TP and send LS to RAN2

-------------------------**Text proposal #2 starts for TS 38.213** ----------------------------

9.3 UCI reporting in physical uplink shared channel

Offset values are defined for a UE to determine a number of resources for multiplexing HARQ-ACK information and for multiplexing CSI reports in a PUSCH. Offset values are also defined for multiplexing CG-UCI [5, TS 38.212] in a CG-PUSCH. The offset values are signalled to a UE either by a DCI format scheduling the PUSCH transmission or by higher layers.

If a DCI format that does not include a beta\_offset indicator field schedules the PUSCH transmission from the UE and the UE is provided *betaOffsets = 'semiStatic'*, the UE applies the , , and  values that are provided by *betaOffsets = 'semiStatic'* for the corresponding HARQ-ACK information, Part 1 CSI reports and Part 2 CSI reports.

If the PUSCH transmission is with a configured grant and the UE is provided *CG-UCI-OnPUSCH= 'semiStatic'*, the UE applies the , $β\_{offset}^{CG-UCI}$, , and  values that are provided by *CG-UCI-OnPUSCH = 'semiStatic'* for the corresponding HARQ-ACK information, CG-UCI, Part 1 CSI reports and Part 2 CSI reports.

If the PUSCH is scheduled by DCI format 0\_0 and the UE is provided *betaOffsets = 'dynamic'*, the UE applies the , , and  values that are determined from the first value of  *betaOffsets = 'dynamic'*.

If the PUSCH is a configured grant Type 2 PUSCH activated by DCI format 0\_0 and the UE is provided *CG-UCI-OnPUSCH* =*'dynamic'*, the UE applies the , $β\_{offset}^{CG-UCI}$, , and  values that are determined from the first value of *CG-UCI-OnPUSCH = 'dynamic'*.

HARQ-ACK information offsets  are configured to values according to Table 9.3-1. The *betaOffsetACK-Index1*, *betaOffsetACK-Index2*, and *betaOffsetACK-Index3* respectively provide indexes , , and  for the UE to use if the UE multiplexes up to 2 HARQ-ACK information bits, more than 2 and up to 11 HARQ-ACK information bits, and more than 11 bits in the PUSCH, respectively.

CG-UCI offsets $β\_{offset}^{CG-UCI}$ are configured to values according to Table 9.3-1.

Part 1 CSI report and Part 2 CSI report offsets  and , respectively, are configured to values according to Table 9.3-2. The *betaOffsetCSI-Part1-Index1* and *betaOffsetCSI-Part2-Index1* respectively provide indexes  and  for the UE to use if the UE multiplexes up to 11 bits for Part 1 CSI reports or Part 2 CSI reports in the PUSCH. The *betaOffsetCSI-Part1-Index2* and *betaOffsetCSI-Part2-Index2* respectively provide indexes  or  for the UE to use if the UE multiplexes more than 11 bits for Part 1 CSI reports or Part 2 CSI reports in the PUSCH.

If a DCI format that includes a beta\_offset indicator field with one bit or two bits, as configured by *uci-OnPUSCH*, schedules the PUSCH transmission from the UE, the UE is provided by each of {*betaOffsetACK-Index1*, *betaOffsetACK-Index2*, *betaOffsetACK-Index3*} a set of two or four  indexes, by each of {betaOffsetCG-UCI-r16} a set of four $I\_{offset}^{CG-UCI}$ indexes, by each of {*betaOffsetCSI-Part1-Index1*, *betaOffsetCSI-Part1-Index2*} a set of two or four  indexes, and by each of {*betaOffsetCSI-Part2-Index1*, *betaOffsetCSI-Part2-Index2*} a set of two or four  indexes from Tables 9.3-1 and 9.3-2, respectively, for multiplexing HARQ-ACK information, CG-UCI, Part 1 CSI reports, and Part 2 CSI reports, respectively, in the PUSCH transmission. The beta\_offset indicator field indicates a  value, a $I\_{offset}^{CG-UCI}$ value, a  value and a  value from the respective sets of values, with the mapping defined in Table 9.3-3 and in Table 9.3-3A.

For a PUSCH transmission that is configured by a *ConfiguredGrantConfig* and includes CG-UCI, the UE multiplexes CG-UCI in the PUSCH transmission if the UE is provided by *betaOffsetCG-UCI-r16* a $I\_{offset}^{CG-UCI}$ value, from a set of values, with the mapping defined in Table 9.3-1. If the UE multiplexes HARQ-ACK information in the PUSCH transmission, as described in Clause 9.2.5, the UE jointly encodes the HARQ-ACK information and the CG-UCI [5, TS 38.212] and determines a number of resources for multiplexing the combined information in a PUSCH using $β\_{offset}^{HARQ-ACK}$ which provides indexes $I\_{offset,1}^{HARQ-ACK}$ and $I\_{offset,2}^{HARQ-ACK}$ for the UE to use if the UE multiplexes up to 11, and more than 11 combined information bits, respectively.

<Unchanged Text Omitted>

------------------------- **Text proposal #2 ends for TS 38.213** -------------------------------

* 1. Issue 4: clarification on min DFI delay

TP from [4]

------------start of TP for 38.213------------------------

10.5 HARQ-ACK information for PUSCH transmissions

A UE can be configured a number of search space sets to monitor PDCCH for detecting a DCI format 0\_1 with a DFI flag field and CRC scrambled with a CS-RNTI provided by *cs-RNTI*. The UE determines that the DCI format provides HARQ-ACK information for PUSCH transmissions based on an when a DFI flag field value is set to '1', if a PUSCH transmission is configured by *ConfiguredGrantConfig*.

The HARQ-ACK information corresponds to transport blocks in PUSCH transmissions for all HARQ processes for a serving cell of a PDCCH reception that provides DCI format 0\_1 or, if DCI format 0\_1 includes a carrier indicator field, for a serving cell indicated by a value of the carrier indicator field.

For a PUSCH transmission configured by *ConfiguredGrantConfig*, HARQ-ACK information for a transport block of a corresponding HARQ process ID is valid if a first symbol of the PDCCH reception is after a last symbol of the PUSCH transmission, or of any repetition of the PUSCH transmission, by a number of symbols provided by *cg-minDFIDelay-r16*.

For an initial transmission by a UE of a transport block in a PUSCH configured by *ConfiguredGrantConfig*, if the UE receives a CG-DFI that provides HARQ-ACK information for the transport block, the UE assumes that the transport block was correctly decoded if the HARQ-ACK information value is ACK; otherwise, the UE assumes that the transport block was not correctly decoded.

For a PUSCH transmission scheduled by a DCI format, HARQ-ACK information for a transport block of a corresponding HARQ process ID is valid if a first symbol of the PDCCH reception is after a last symbol of the PUSCH transmission by a number of symbols provided by *cg-minDFIDelay-r16*  or, if the PUSCH transmission is over multiple slots,

- after a last symbol of the PUSCH transmission in a first slot from the multiple slots by a number of symbols provided by *cg-minDFIDelay-r16*, if a value of the HARQ-ACK information is ACK.

- after a last symbol of the PUSCH transmission in a last slot from the multiple slots by a number of symbols provided by *cg-minDFIDelay-r16*, if a value of the HARQ-ACK information is NACK.

UE does not expect to be configured with different *cg-minDFIDelay-r16* among multiple *ConfiguredGrantConfig* in one BWP.

------------end of TP -------------------------------

* 1. Issue 5: multi PUSCH related TPs

TPs from [6]

----------------------------------------- TP #1 for 38.213 10.2------------------------------------------------------

10.2 PDCCH validation for DL SPS and UL grant Type 2

A UE validates, for scheduling activation or scheduling release, a DL SPS assignment PDCCH or a configured UL grant Type 2 PDCCH if

- the CRC of a corresponding DCI format is scrambled with a CS-RNTI provided by *cs-RNTI*, and

- the new data indicator field in the DCI format for the enabled transport block is set to '0' or set to all ‘0’ when DCI includes NDIs for multiple PUSCHs, and

- the DFI flag field, if present, in the DCI format is set to '0', and

- if validation is for scheduling activation and if the PDSCH-to-HARQ\_feedback timing indicator field in the DCI format is present, the PDSCH-to-HARQ\_feedback timing indicator field does not provide an inapplicable value from dl-DataToUL-ACK.

<unchanged part omitted>

-------------------------------------------------END OF TP #1-----------------------------------------------------------

----------------------------------------- TP #2 for 38.214 6.1.2.3------------------------------------------------------

A set of allowed periodicities *P* are defined in [12, TS 38.331]. The higher layer parameter *cg-nrofSlots-r16*, provides the number of consecutive slots allocated within a configured grant period. The higher layer parameter *cg-nrofPUSCH-InSlot-r16* provides the number of consecutive PUSCH allocations within a slot, where the first PUSCH allocation follows the higher layer parameter *timeDomainAllocation* for Type 1 PUSCH transmission or the higher layer configuration according to [10, TS 38.321], and UL grant received on the DCI for Type 2 PUSCH transmissions, and the remaining PUSCH allocations have the same length and PUSCH mapping type, and are appended following the previous allocations without any gaps. The same combination of start symbol and length and PUSCH mapping type repeats over the consecutively allocated slots. If the PUSCH time domain resource allocation configuration is determined according to the Table 6.1.2.1.1-1A, and *pusch-Config* includes *pusch-TimeDomainAllocationList-ForMultiPUSCH,* the first PUSCH allocation follows the first SLIV in the indicated entry by the higher layer parameter *timeDomainAllocation* for Type 1 PUSCH transmission or UL grant received on the DCI for Type 2 PUSCH transmissions.

<unchanged part omitted>

-------------------------------------------------END OF TP #2-----------------------------------------------------------

----------------------------------------- TP #3 for 38.214 6.1.2.3------------------------------------------------------

A set of allowed periodicities *P* are defined in [12, TS 38.331]. The higher layer parameter *cg-nrofSlots-r16*, provides the number of consecutive slots allocated within a configured grant period. The higher layer parameter *cg-nrofPUSCH-InSlot-r16* provides the number of consecutive PUSCH allocations within a slot, where the first PUSCH allocation follows the higher layer parameter *timeDomainAllocation* for Type 1 PUSCH transmission or the higher layer configuration according to [10, TS 38.321], and UL grant received on the DCI for Type 2 PUSCH transmissions, and the remaining PUSCH allocations have the same length and PUSCH mapping type, and are appended following the previous allocations without any gaps. The same combination of start symbol and length and PUSCH mapping type repeats over the consecutively allocated slots. For the PUSCH retransmission scheduled by a PDCCH with CRC scrambled by CS-RNTI, if the PUSCH time domain resource allocation configuration applies the Table 6.1.2.1.1-1A, and *pusch-Config* includes *pusch-TimeDomainAllocationList-ForMultiPUSCH,* the NDI = 0 indicatesthe corresponding SLIV is not applicable, and NDI=1 indicates retransmission with the corresponding indicated SLIV.

<unchanged part omitted>

-------------------------------------------------END OF TP #3-----------------------------------------------------------

# References

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | [R1-2007903](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007903.zip) | Remaining Issues and Corrections on Channel Access Procedures and Configured Grants for NR-U | Nokia, Nokia Shanghai Bell |
| 2 | [R1-2007962](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007962.zip) | Remaining issues on the configured grant for NR-U | ZTE, Sanechips |
| 3 | [R1-2008043](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008043.zip) | Remaining issues of channel access procedure and configured grant for NR-U | LG Electronics |
| 4 | [R1-2008632](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008632.zip) | Remaining issues for DFI in NR-U | ASUSTeK |
| 5 | [R1-2008662](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008662.zip) | Remaining issues on CG-PUSCH | vivo |
| 6 | [R1-2008663](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008663.zip) | TPs on HARQ feedback in CG-DFI for CBG-based PUSCH transmission | vivo |