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

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

**Agenda Item: 6.2.2**

**Source: Moderator (ZTE)**

**Title: Summary of email discussion [103-e-LTE-NB\_IoTenh3-03]**

**Document for: Discussion and Decision**

# Introduction

This contribution provides discussion on the following issues:

 [103-e-LTE-NB\_IoTenh3-03] Multi-TB issues – Huiying (ZTE)

* Issue #1: clarification of HARQ ID assumption (section 2.1 of R1-2007714)
* Issue #2: clarification of usage of NDI (section 2.2 of R1-2007714)
* Discussion and decision by 10/29, TPs by 11/5

# Discussion

**Issue #1: clarification of HARQ ID assumption**

As discussed in section 2.1 of [1], ‘otherwise’ part in 16.4.1.5 of 36.213 includes single HARQ process case and multiple TB case, ‘HARQ process ID of 0 shall be assumed’ is correct for single HARQ process case but cannot be applied for multiple TB case.

***Proposal: Endorse Text Proposal #1:***

**------------------------------------------------ Start of Text Proposal # 1 to 36.213 --------------------------------------**

16.4.1.5 Modulation order and transport block size determination

<Unchanged parts are omitted>

For a NPDCCH UE-specific search space, if the UE is configured with higher layer parameter *twoHARQ-ProcessesConfig*, or the UE is configured with higher layer parameter *npdsch-MultiTB-Config* and single TB is scheduled in the corresponding DCI

- the NDI and HARQ process ID as signalled on NPDCCH, and the TBS, as determined above, shall be delivered to higher layers,

otherwise

- the NDI as signalled on NPDCCH, and the TBS, as determined above, shall be delivered to higher layers. If the UE is configured with higher layer parameter *npdsch-MultiTB-Config* and multiple TB are scheduled in the corresponding DCI, the HARQ process ID of 0 is for the first TB and HARQ process ID of 1 shall be assumed for the second TB, otherwise, HARQ process ID of 0 shall be assumed.

<Unchanged parts are omitted>

**-------------------------------------------------- End of Text Proposal #1 to 36.213 --------------------------------------**

Please input your views/comments in the following table:

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**Issue #2: clarification of usage of NDI**

As discussed in section 2.2 of [1], in current specification TS36.212, if ‘Number of scheduled TB for Unicast’ field indicates that 2 TBs are scheduled, ‘HARQ process number’ field would functions as New data indicator for the second TB. However, it is not clear which DCI field is used for the NDI corresponding to the first TB. In another word, the function of 1-bit ‘New data indicator’ field is not clear when multiple TBs are scheduled. Therefore, a clarification is proposed for ‘New data indicator’ filed.

***Proposal: Endorse Text Proposal #2.***

**------------------------------------------------ Start of Text Proposal #2 to 36.212 ---------------------------------------**

6.4.3.1 DCI Format N0

<Unchanged parts are omitted>

Otherwise

- Subcarrier indication – 6 bits as defined in clause 16.5.1.1 of [3]

- Resource assignment – 3 bits as defined in clause 16.5.1.1 of [3]

- Scheduling delay – 2 bits as defined in clause 16.5.1 of [3]

- Modulation and coding scheme – 4 bits as defined in clause 16.5.1.2 of [3]. This field is not present if format N0 CRC is scrambled by PUR C-RNTI.

- Redundancy version – 1 bit as defined in clause 16.5.1.2 of [3]

- Repetition number – 3 bits as defined in clause 16.5.1.1 of [3]

- New data indicator – 1 bit. If multiple TB are scheduled, it functions for the first TB.

- DCI subframe repetition number – 2 bits as defined in clause 16.6 in [3]

- Number of scheduled TB for Unicast – 1 bit, where value 0 indicates a single TB is scheduled and value 1 indicates multiple TB are scheduled. This field is only present if higher layer parameter *npusch-MultiTB-Config* is enabled and the corresponding DCI is mapped onto the UE specific search space given by the C-RNTI as defined in [3]. The field is set to 0 if the CRC of the DCI is scrambled by SPS C-RNTI.

- HARQ process number – 1 bit. This field is only present if 2 HARQ processes are configured and the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3], or if Number of scheduled TB for Unicast is present. If multiple TB are scheduled, it functions as New data indicator for the second TB.

- Resource reservation – 1 bit as defined in clause 16.5 of [3]. This field is only present if higher layer parameter *valid-subframe-config-UL* or *slot-reserved-resource-config-UL* is configured and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

If the number of information bits in format N0 mapped onto the UE specific search space given by the C-RNTI as defined in [3] is less than that of format N1 in the same search space, zeros shall be appended to format N0 until the payload size equals that of format N1.

<Unchanged parts are omitted>

6.4.3.2 DCI Format N1

<Unchanged parts are omitted>

Otherwise,

- Scheduling delay – 3 bits as defined in clause 16.4.1 of [3]

- Resource assignment – 3 bits as defined in clause 16.4.1.3 of [3]

- Modulation and coding scheme – 4 bits as defined in clause 16.4.1.5 of [3]

- Repetition number – 4 bits as defined in clause 16.4.1.3 of [3]

- New data indicator – 1 bit. If multiple TB are scheduled, it functions as New data indicator for the first TB.

- HARQ-ACK resource – 4 bits as defined in clause 16.4.2 of [3].

- DCI subframe repetition number – 2 bits as defined in clause 16.6 in [3]

- Number of scheduled TB for SC-MTCH – 3 bits, indicating from 1 to 8 TBs. This field is only present if higher layer parameter *sc-mtch-InfoListMultiTB-r16* is enabled and the CRC of the DCI is scrambled by G-RNTI.

- Number of scheduled TB for Unicast – 1 bit, where value 0 indicates a single TB is scheduled and value 1 indicates multiple TB are scheduled. This field is only present if higher layer parameter *npdsch-MultiTB-Config* is enabled and the corresponding DCI is mapped onto the UE specific search space given by the C-RNTI as defined in [3]

- HARQ process number – 1 bit. This field is only present if 2 HARQ processes are configured and the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3], or if Number of scheduled TB for Unicast is present. If multiple TB are scheduled, it functions as New data indicator for the second TB.

- Resource reservation – 1 bit as defined in clause 16.4 of [3]. This field is only present if higher layer parameter *valid-subframe-config-DL* or *slot-reserved-resource-config-DL* is configured and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

<Unchanged parts are omitted>

**--------------------------------------------------- End of Text Proposal #2 to 36.212 -------------------------------------**

Please input your views/comments in the following table:

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# Summary

**References**

[1] 3GPP, R1-2007714, Clarifications on scheduling enhancement for NB-IoT, RAN1 #103-e, ZTE