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

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

Source: Moderator (OPPO)

Title: Discussions on Issue MT.1

Agenda Item: 7.2.6

Document for: Discussion and Decision

The Issue of MT.1

The UE capability of out-of-order operation of PUSCH/PDCCH in mTRP is specified by the feature group 16-2a-3 in R1-2100113:

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| 16-2a-3 | Out-of-order operation for UL | 1. Support out-of-order operation for PDCCH to PUSCH | 16-2a | Yes | N/A |  | Per band | No | No |  | Note: “Same closed loop index for power control across PUSCHs associated with different CORESETPoolIndex values is not supported by a UE indicating the support of this feature” | Optional with capability signalling |

OPPO (R1-2100113), ZTE (R1-2100281) and Huawei/HiSi (R1-2101256) explained in their tdoc that the note added here could cause some critical issues.

* The note would result in that in FR1, the system can not schedule PUSCHs by PDCCH of different CORESETPoolIndex value to a UE supporting the UE capability of 16-2a-3. Because typically in FR1, only one SRS resource is configured for PUSCH transmission and there is no SRI field in DCI. Thus, a same default closed loop index is always applied to all the PUSCH transmissions.
* To make the system work, the note seems to mandate the gNB to implement two different close loops based on UE capability reporting, no matter whether gNB needs 16-2a-3 functionality.

To resolve that issue, OPPO, ZTE and Huawei/HiSi proposed different solutions or TPs:

* OPPO and ZTE proposed to specify in 38.213 that when the DCI does not have SRI field or when SRI-PUSCH-PowerControl is not provided (i.e., only one default closed-loop index is assumed as specified in current spec), the UE would assume different closed loop index for PUSCHs towards different TRPs.
* ZTE and Huawei/HiSi proposed to capture the scheduling restriction imposed by that Note in the spec even through they proposed different TPs.

## **Round#1 discussion**

Based on the proposals by OPPO/ZTE/HW, here is the initial proposal for MT.1

**Proposal: For issue MT.1:**

* **In Section 7.1.1 of 38.213, for the case when DCI does not have SRI field or SRI-PUSCH-PowerControl is not provided, we clarify that the PUSCHs scheduled by PDCCH of different CORESETPoolindex are associated with different default closed loop index**
* **In section 6.1 of 38.214, we capture the restriction described by the note of FG 16-2a-3 into the description of PUSCH out-order-operation.**

The TP for 38.213:

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| **7.1.1 UE behaviour**\*\*\* Unchanged text is omitted \*\*\*-  if the UE is configured with *twoPUSCH-PC-AdjustmentStates* and  if the UE is not configured with *twoPUSCH-PC-AdjustmentStates* or if the PUSCH transmission is scheduled by a RAR UL grant as described in Clause 8.3- For a PUSCH (re)transmission configured by *ConfiguredGrantConfig*, the value of  is provided to the UE by *powerControlLoopToUse*- If the UE is provided *SRI-PUSCH-PowerControl*, the UE obtains a mapping between a set of values for the SRI field in a DCI format scheduling the PUSCH transmission and the  value(s) provided by *sri-PUSCH-ClosedLoopIndex* and determines the  value that is mapped to the SRI field value- If the PUSCH transmission is scheduled by a DCI format that does not include an SRI field, or if an *SRI-PUSCH-PowerControl* is not provided to the UE, *l*=1 if the PUSCH is scheduled by a PDCCH received in a CORESET which is configured with *CORESETPoolIndex* equal to 1 and othersiwe - If the UE obtains one TPC command from a DCI format 2\_2 with CRC scrambled by a TPC-PUSCH-RNTI, the  value is provided by the closed loop indicator field in DCI format 2\_2 |

The TP for 38.214:

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| **6.1 UE procedure for transmitting the physical uplink shared channel**\*\*\* Unchanged text is omitted \*\*\*If a UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in *ControlResourceSet* for the active BWP of a serving cell and PDCCHs that schedule two non-overlapping in time domain PUSCHs are associated to different *ControlResourceSets* having different values of *CORESETPoolIndex,* for any two HARQ process IDs in a given scheduled cell, if the UE is scheduled to start a first PUSCH transmission starting in symbol *j* by a PDCCH associated with a value of *CORESETpoolIndex* ending in symbol *i*, the UE can be scheduled to transmit a PUSCH starting earlier than the end of the first PUSCH by a PDCCH associated with a different value of *CORESETpoolIndex* that ends later than symbol *i* and the UE is expected to be provided with a closed loop index for that PUSCH different from the closed loop index of the first PUSCH.\*\*\* Unchanged text is omitted \*\*\* |

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