**3GPP TSG RAN WG1 Meeting #100bis-e R1-200xxxx**

**E-Meeting, April 20 – 30, 2020**

**Agenda Item: 6.2.3.1.1**

**Source: Moderator (Huawei)**

**Title: TP on puncturing and rate matching of PUSCH and PUCCH**

**Document for: Discussion and Decision**

# Introduction

This documents provides the text proposal as the outcome of the following email discussion [1]

[100b-e-LTE-LTE\_DL\_MIMO\_EE-01] Collision of additional SRS and PUSCH/PUCCH/PRACH (Issues 4, 5, 6, 7 as described in R1-2002701) by 4/24 and corresponding TP (if any) by 4/30 – Yubo (Huawei)

# Discussion

**Reason for changes:**

PUSCH rate matching and PUCCH rate matching/puncturing should not be applied to additional SRS symbol(s).

**Summary of changes:**

PUSCH rate matching and PUCCH rate matching/puncturing are corrected to not be applied to additional SRS symbol(s).

**Specs/sections impacted:**

TS 36.211: 5.3.4

TS 36.213: 8.2

**Consequences if not approved:**

PUSCH rate matching and PUCCH rate matching/puncturing are incorrectly performed to additional SRS symbol(s).

==============================Start of text proposal to TS 36.211=====================

< Unchanged parts are omitted>

5.3.4 Mapping to physical resources

For each antenna port  used for transmission of the PUSCH in a subframe the block of complex-valued symbols  shall be multiplied with the amplitude scaling factor  in order to conform to the transmit power specified in clause 5.1.1.1 in 3GPP TS 36.213 [4], and mapped in sequence starting with  to physical resource blocks on antenna port  and assigned for transmission of PUSCH. The relation between the index  and the antenna port number  is given by Table 5.2.1-1. The mapping to resource elements  corresponding to the physical resource blocks assigned for transmission shall fulfil the following criteria:

- not used for transmission of reference signals, and

- not part of the last SC-FDMA symbol in a subframe, if the UE transmits SRS in the same subframe in the same serving cell, and

- not part of the last SC-FDMA symbol in a subframe configured with cell-specific SRS for non-BL/CE UEs and BL/CE UEs in CEModeA, if the PUSCH transmission partly or fully overlaps with the cell-specific SRS bandwidth, and

- not part of an SC-FDMA symbol reserved for possible trigger type 1 SRS transmission as specified in [4] in a UE-specific aperiodic SRS subframe in the same serving cell, and

- not part of an SC-FDMA symbol reserved for possible trigger type 0 SRS transmission as specified in [4] in a UE-specific periodic SRS subframe in the same serving cell when the UE is configured with multiple TAGs

- not part of the first SC-FDMA symbol in a subframe if the associated DCI indicates PUSCH starting position '01', '10', or '11' and does not indicate PUSCH mode 2.

- not part of the first SC-FDMA symbol in the second slot in a subframe if the associated DCI indicates PUSCH starting position '01', '10', or '11' and PUSCH mode 2.

- not part of the last SC-FDMA symbol in a subframe if the associated DCI indicates PUSCH ending symbol '1' and does not indicate PUSCH mode 3.

- not part of the second slot in a subframe if the associated DCI indicates PUSCH ending symbol '0' and PUSCH mode 3.

- not part of SC-FDMA symbols 5 to 13 in a subframe if the associated DCI indicates PUSCH ending symbol '1' and PUSCH mode 3.

< Unchanged parts are omitted>

==============================End of text proposal to TS 36.211=====================

==============================Start of text proposal to TS 36.213=====================

< Unchanged parts are omitted>

8.2 UE sounding procedure

< Unchanged parts are omitted>

The parameter *ackNackSRS-SimultaneousTransmission* provided by higher layers determines if a UE is configured to support the transmission of HARQ-ACK on PUCCH and SRS in one subframe/slot/subslot. If it is configured to support the transmission of HARQ-ACK on PUCCH and SRS in one subframe/slot/subslot, then in the cell specific SRS subframes of the primary cell in case of subframe-PUCCH or in the last slot/subslot of the cell specific SRS subframes of the primary cell in case of slot/subslot-PUCCH,

- if the UE transmits PUCCH format 1/1a/1b/3, the UE shall transmit HARQ-ACK and SR using the shortened PUCCH format as defined in Subclauses 5.4.1, 5.4.2A, and 5.4A.3 of [3], where the HARQ-ACK or the SR symbol corresponding to the SRS location in the last symbol of the subframe is punctured.

- If the UE transmits PUCCH format 4/5 partly or fully overlapping with the cell specific SRS bandwidth in the cell specific SRS subframes of the primary cell, then UE shall transmit UCI using the shortened PUCCH format as defined in Subclauses 5.4.2B, 5.4.2C, and 5.4A.4 of [3].

For PUCCH format 1/1a/1b/3, this shortened PUCCH format shall be used in a cell specific SRS subframe or the last slot/subslot of the cell specific SRS subframe of the primary cell even if the UE does not transmit SRS in that subframe. For PUCCH format 4/5, this shortened PUCCH format shall be used if the PUCCH transmission partly or fully overlaps with the cell-specific SRS bandwidth in the cell specific SRS subframes or the last slot/subslot of the cell specific SRS subframes of the primary cell even if the UE does not transmit SRS in that subframe, or if the UE transmits SRS in the last symbol of that subframe even if the PUCCH format 4/5 does not partly or fully overlap with the cell-specific SRS. The cell specific SRS subframes are defined in Subclause 5.5.3.3 of [3]. Otherwise, the UE shall use the normal PUCCH format 1/1a/1b as defined in Subclause 5.4.1, and 5.4A.2 of [3] or normal PUCCH format 3 as defined in Subclause 5.4.2A, and 5.4A.3 or normal PUCCH format 4 as defined in Subclause 5.4.2B, and 5.4A.4 or normal PUCCH format 5 as defined in Subclause 5.4.2C of [3].

< Unchanged parts are omitted>

==============================End of text proposal to TS 36.213=====================

# References

1. R1-2002701 Feature summary on 100b-e-LTE-LTE\_DL\_MIMO\_EE-01 Moderator(Huawei)