**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 collision handling of additional SRS**

**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:**

The collision handling between additional SRS and PUCCH/PUSCH in CA cases have not been captured.

**Summary of changes:**

The collision handling between additional SRS and PUCCH/PUSCH in CA cases for both within the same band/TAG/TP and within multiple TAGs is captured.

**Specs/sections impacted:**

TS 36.213: 5.1.1.1, 8.2

**Consequences if not approved:**

The spec is incomplete in handling the collision between additional SRS

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

5.1.1.1 UE behaviour

< Unchanged parts are omitted>

If the UE is not configured with a SCG or a PUCCH-SCell, and

- If the UE is configured with multiple TAGs, and if the PUCCH/PUSCH transmission of the UE on subframe/slot/subslot  for a given serving cell in a TAG overlaps some portion of the first symbol of the PUSCH transmission on subframe/slot/subslot  for a different serving cell in another TAG the UE shall adjust its total transmission power to not exceed on any overlapped portion.

- If the UE is configured with multiple TAGs, and if the PUSCH transmission of the UE on subframe/slot/subslot  for a given serving cell in a TAG overlaps some portion of the first symbol of the PUCCH transmission on subframe/slot/subslot  for a different serving cell in another TAG the UE shall adjust its total transmission power to not exceed on any overlapped portion.

- If the UE is configured with multiple TAGs, and if the trigger type 0/1 SRS transmission of the UE in a symbol on subframe/slot/subslot  for a given serving cell in a TAG overlaps with the PUCCH/PUSCH transmission on subframe/slot/subslot or subframe/slot/subslot  for a different serving cell in the same or another TAG the UE shall drop trigger type 0/1 SRS if its total transmission power exceeds on any overlapped portion of the symbol.

- If the UE is configured with multiple TAGs, and if the trigger type 2 SRS transmission of the UE in a symbol on subframe/slot/subslot $i$ for a given serving cell in a TAG overlaps with the PUCCH/PUSCH transmission on subframe/slot/subslot $i$, $i-1$ or $i+1$ for a different serving cell in the same or another TAG, the UE shall drop the trigger type 2 SRS in the overlapped symbol if its total transmission power exceeds $P\_{CMAX}$ on any overlapped portion of the symbol.

- If the UE is configured with multiple TAGs and more than 2 serving cells, and if the trigger type 0/1 SRS transmission of the UE in a symbol on subframe/slot/subslot  for a given serving cell overlaps with the SRS transmission on subframe/slot/subslot  for a different serving cell(s) and with PUSCH/PUCCH transmission on subframe/slot/subslot or subframe/slot/subslot  for another serving cell(s) the UE shall drop the trigger type 0/1 SRS transmissions if the total transmission power exceeds on any overlapped portion of the symbol.

- If the UE is configured with multiple TAGs and more than 2 serving cells, and if the trigger type 2 SRS transmission of the UE in a symbol on subframe/slot/subslot $i$ for a given serving cell overlaps with the SRS transmission on subframe/slot/subslot $i-1$, $i$ or $i+1$ for a different serving cell(s) and with PUSCH/PUCCH transmission on subframe/slot/subslot $i-1$, $i$ or $i+1$ for another serving cell(s), the UE shall drop the trigger type 2 SRS transmission in the overlapped symbol if the total transmission power exceeds $P\_{CMAX}$ on any overlapped portion of the symbol.

- If the UE is configured with multiple TAGs, the UE shall, when requested by higher layers, to transmit PRACH in a secondary serving cell in parallel with SRS transmission in a symbol on a subframe of a different serving cell belonging to a different TAG, drop SRS if the total transmission power exceeds on any overlapped portion in the symbol.

- If the UE is configured with multiple TAGs, the UE shall, when requested by higher layers, to transmit PRACH in a secondary serving cell in parallel with PUSCH/PUCCH in a different serving cell belonging to a different TAG, adjust the transmission power of PUSCH/PUCCH so that its total transmission power does not exceed on the overlapped portion.

< Unchanged parts are omitted>

8.2 UE sounding procedure

< Unchanged parts are omitted>

If a UE is not configured with multiple TAGs and the UE is not configured with the parameter *srs-UpPtsAdd* for trigger type 1 and the UE is not configured with trigger type 2 SRS transmission, or if a UE is not configured with multiple TAGs and the UE is not configured with more than one serving cell of different CPs and the UE is not configured with trigger type 2 SRS transmission, or if a UE is configured for PUSCH transmission in UpPTS and a SRS transmission overlaps with a PUSCH transmission on the same symbol in UpPTS within a TDD serving cell, the UE shall not transmit trigger type 0/1 SRS in a symbol whenever SRS and PUSCH transmissions happen to overlap in the same symbol, except when the SRS is on a TDD serving cell not configured for PUSCH/PUCCH transmission.

For the case when a trigger type 0/1 SRS transmission in a first serving cell happens to overlap in the same symbol as a PUSCH transmission in a second serving cell, and the first and second serving cells are in the same TAG, same band, and use the same cyclic prefix, the UE may drop the trigger type 0/1 SRS transmission.

For the case when a trigger type 2 SRS transmission in a first serving cell happens to overlap in the same symbol as the PUSCH/PUCCH transmission in a second serving cell, and the first and second serving cells are in the same TAG, same band, and use the same cyclic prefix, the UE may drop the trigger type 2 SRS transmission in the overlapped symbol.

For TDD serving cell, and UE not configured with additional SC-FDMA symbols in UpPTS, when one SC-FDMA symbol exists in UpPTS of the given serving cell, it can be used for SRS transmission, when two SC-FDMA symbols exist in UpPTS of the given serving cell, both can be used for SRS transmission and for trigger type 0 SRS both can be assigned to the same UE. For TDD serving cell, and if the UE is configured with two or four additional SC-FDMA symbols in UpPTS of the given serving cell, all can be used for SRS transmission and for trigger type 0 SRS at most two SC-FDMA symbols out of the configured additional SC-FDMA symbols in UpPTS can be assigned to the same UE, except for UE not configured for PUSCH/PUCCH transmission or for UE supporting *ce-srsEnhancement-r14,* where all can be assigned to the same UE. A UE is not expected to be configured with trigger type 2 SRS in UpPTS.

If a UE is not configured with multiple TAGs and the UE is not configured with the parameter *srs-UpPtsAdd* for trigger type 1 and the UE is not configured with trigger type 2 SRS transmission, or if a UE is not configured with multiple TAGs and the UE is not configured with more than one serving cell of different CPs and the UE is not configured with trigger type 2 SRS transmission, or if a UE is configured with multiple TAGs and type 0/1 SRS and PUCCH format 2/2a/2b happen to coincide in the same subframe in the same serving cell, except when the SRS is on a TDD serving cell not configured for PUSCH/PUCCH transmission,

- The UE shall not transmit type 0 triggered SRS whenever type 0 triggered SRS and PUCCH format 2/2a/2b transmissions happen to coincide in the same subframe;

- The UE shall not transmit type 1 triggered SRS whenever type 1 triggered SRS and PUCCH format 2a/2b or format 2 with HARQ-ACK transmissions happen to coincide in the same subframe;

- The UE shall not transmit PUCCH format 2 without HARQ-ACK whenever type 1 triggered SRS and PUCCH format 2 without HARQ-ACK transmissions happen to coincide in the same subframe.

If a UE is not configured with multiple TAGs and the UE is not configured with the parameter *srs-UpPtsAdd* for trigger type 1 and the UE is not configured with trigger type 2 SRS transmission, or if a UE is not configured with multiple TAGs and the UE is not configured with more than one serving cell of different CPs and the UE is not configured with trigger type 2 SRS transmission, or if a UE is configured with multiple TAGs and trigger type 0/1 SRS and PUCCH happen to coincide in the same subframe/slot/subslot in the same serving cell, except when the SRS is on a TDD serving cell not configured for PUSCH/PUCCH transmission,

- The UE shall not transmit type 0/1 SRS whenever SRS transmission and PUCCH transmission carrying HARQ-ACK and/or positive SR happen to coincide in the same subframe/slot/subslot if the parameter *ackNackSRS-SimultaneousTransmission* is *FALSE*;

- For FDD-TDD and primary cell frame structure 1, the UE shall not transmit type 0/1 SRS in a symbol whenever SRS transmission and PUCCH transmission carrying HARQ-ACK and/or positive SR using shortened format as defined in Subclauses 5.4.1, 5.4.2A, 5.4.2B, 5.4.2C, and 5.4A of [3] happen to overlap in the same symbol if the parameter *ackNackSRS-SimultaneousTransmission* is *TRUE.*

- Unless otherwise prohibited, the UE shall transmit type 0/1 SRS whenever SRS transmission and PUCCH transmission carrying HARQ-ACK and/or positive SR using shortened format as defined in Subclauses 5.4.1, 5.4.2A, and 5.4A of [3] happen to coincide in the same subframe/slot/subslot if the parameter *ackNackSRS-SimultaneousTransmission* is *TRUE*.

If a UE is not configured with multiple TAGs and the UE is not configured with the parameter *srs-UpPtsAdd* for trigger type 1 and the UE is not configured with trigger type 2 SRS transmission, or if a UE is not configured with multiple TAGs and the UE is not configured with more than one serving cell of different CPs and the UE is not configured with trigger type 2 SRS transmission, the UE shall not transmit SRS whenever SRS transmission on any serving cells and PUCCH transmission carrying HARQ-ACK and/or positive SR using normal PUCCH format as defined in Subclauses 5.4.1, 5.4.2A, and 5.4A of [3] happen to coincide in the same subframe/slot/subslot.

In UpPTS, whenever SRS transmission instance overlaps with the PRACH region for preamble format 4 or exceeds the range of uplink system bandwidth configured in the serving cell, the UE shall not transmit SRS.

< 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)