**3GPP TSG RAN WG1 Meeting #104bis-e R1-21xxxxx**

**E-meeting, April 12 – 20, 2021**

**Agenda Item: 7.1**

**Source: Moderator (Huawei)**

**Title: Summary of [104b-e-NR-7.1CRs-02] Correction on prioritization rules of SRS carrier switching**

**Document for: Discussion and Decision**

# Introduction

This document is created to on following Email discussion.

**[104b-e-NR-7.1CRs-02]** Issue#21: Correction on prioritization rules of SRS carrier switching – ~~TBD~~ Keyvan (Huawei) by April 16

[**R1-2103759**](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_104b\Docs\R1-2103759.zip) Correction on prioritization rules of SRS carrier switching Huawei, HiSilicon

As the deadline for the email and the potential TP is set on April 16, I appreciate it if you could provide your views by **UTC 23:59 pm, April 13.**

# Discussion

The CR in [1] relates to prioritization/collision handling rules for SRS carrier switching defined in S6.2.1.3 of TS 38.214. However, it is unclear in S6.2.1.3 of TS 38.214 the prioritization rules affect the transmissions on which carriers and how to determine a case “beyond” a UE’s indicated UL-CA capability. For example, it is not clear whether the prioritization rules also apply to an uplink carrier in the same band as the uplink carrier configured as a “switch-from” carrier for SRS carrier switching. Such issue has been discussed in Rel-14 LTE by R1-1712771, R1-1714652 and R1-1809001, and solved in Rel-14 LTE by CR R1-1721095 and R1-1809554/R1-1809555. In particular, it was agreed and included in 36.213 that the prioritization rules apply to the set of carriers S(d)= {s0(d),… sN-1(d)} that meet all the following conditions:

- {*s*0(*d*)… *s*N-1(*d*)} are in the same band as *s*0(*d*).

- {*s*0(*d*)… *s*N-1(*d*)} have the same CP as *s*0(d).

- {*s*0(*d*)… *s*N-1(*d*)} are in the same TAG as *s*0(d).

where d is the serving cell transmitting the carrier switching SRS, s0(d) is the “switch-from” carrier as indicated in *srs-SwitchFromServCellIndex,* and above definition of S(d) is based on the following agreement in RAN1#90:

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| ***Agreement in Principle:***  *Capture the following in 36.213:*   * *The “same PA” is implicitly identified by the following. Two “CC with the same PA” are those that:*   + *Are in the same band*   + *Are in the same TAG*   + *Have the same CP* * *Adopt the following solution for the cases of collision between SRS switching and victim CC:*   + *Extend collision rules to victim CC (i.e., the transmission of SRS depends on the information transmitted in the source CC and the victim CC).*   *CR to be prepared for RAN1#90bis.* |

The change request in [1] is based on a similar SRS carrier switching collision handling as in Rel-14 LTE. This is due to the fact that, according to the RAN1#90bis agreement below, a collision handling of SRS carrier switching similar to Rel-14 LTE should be specified (relevant parts of the agreement in highlighted in yellow):

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| ***Agreement:***  *Specify NR SRS switching among CCs similar to Rel-14 LTE SRS carrier-based switching design including*   * + *Periodic/aperiodic/semi-persistent SRS on a CC without PUCCH/PUSCH configured*   + *TA (through PRACH) on TAG without PUSCH/PUCCH configured*   + *Power control separated from that of PUSCH*   + *Group common DCI for aperiodic SRS triggering and TPC*   + *DL/UL interruptions and collision handling due to SRS switching* |

# Company views

**Do you agree with changes in proposed CR? If not, why?**

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| **Company** | **Agree or not** | **Comment** |
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# Conclusions

# References

1. R1-2103759, Correction on prioritization rules of SRS carrier switching, Huawei, HiSilicon

# Appendix: Proposed CR in R1-2103759

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| **<Unchanged parts are omitted>**  3.3 Abbreviations  TAG Timing advance group  TB Transport Block  TCI Transmission Configuration Indicator  TDM Time division multiplexing  UE User equipment  UL Uplink  **<Unchanged parts are omitted>**  6.2.1.3 UE sounding procedure between component carriers  For a carrier of a serving cell *d* with slot formats comprised of DL and UL symbols, not configured for PUSCH/PUCCH transmission, denote as *s*0(*d*) the corresponding carrier of a serving cell whose UL transmissions are temporarily suspended as signalled by higher layer parameter *srs-SwitchFromServCellIndex* and *srs-SwitchFromCarrier*. Define the set *S*(*d*)*=* {*s*0(*d*)… *s*N-1(*d*)} as the set of carriers of serving cells that meet all the following conditions:  - {*s*0(*d*)… *s*N-1(*d*)} are in the same band as *s*0(*d*).  - {*s*0(*d*)… *s*N-1(*d*)} have the same SCS as *s*0(d).  - {*s*0(*d*)… *s*N-1(*d*)} are in the same TAG as *s*0(d).  The following prioritization rules shall be applied in case of collision between a transmission of SRS over carrier *d* and transmission of a physical signal/channel over a carrier of a serving cell in set *S(d)*:  - the UE shall not transmit SRS whenever SRS transmission (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133] as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR)* on the carrier of the serving cell *d* and PUSCH/PUCCH transmission carrying HARQ-ACK/positive SR/RI/CRI/SSBRI and/or PRACH on a carrier of a serving cell in set *S(d)* happen to overlap in the same symbol.  - the UE shall not transmit a periodic/semi-persistent SRS whenever periodic/semi-persistent SRS transmission (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133] as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR)* on the carrier of the serving cell *d* and PUSCH transmission carrying aperiodic CSI on a carrier of a serving cell in set *S(d)* happen to overlap in the same symbol.  - the UE shall drop PUCCH/PUSCH transmission carrying periodic CSI comprising only CQI/PMI/L1-RSRP/L1-SINR, and/or SRS transmission on a carrier of a serving cell in set *S(d)*  configured for PUSCH/PUCCH transmission whenever the transmission and SRS transmission (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133] as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR)* on the carrier of the serving cell *d* happen to overlap in the same symbol.  - the UE shall drop PUSCH transmission carrying aperiodic CSI comprising only CQI/PMI/L1-RSRP/L1-SINR on a carrier of a serving cell in set *S(d)* whenever the transmission and aperiodic SRS transmission (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133]) as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR)* on the carrier of the serving cell *d* happen to overlap in the same symbol.  For an aperiodic SRS triggered in DCI format 2\_3 and if the UE is configured with higher layer parameter *srs-TPC-PDCCH-Group* set to 'typeA', and given by *SRS-CarrierSwitching,* without PUSCH/PUCCH transmission, the order of the triggered SRS transmission on the serving cells follow the order of the serving cells in the indicated set of serving cells configured by higher layers, where the UE in each serving cell transmits the configured one or two SRS resource set(s) with higher layer parameter *usage* set to 'antennaSwitching' and higher layer parameter *resourceType* in *SRS-ResourceSet* set to 'aperiodic'.  **<Unchanged parts are omitted>** |