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

**e-Meeting, Jan. 25th – Feb. 5th, 2021**

**Source: Moderator (ZTE)**

Title: FL summary #2 on SRS enhancements

Agenda Item: 8.1.3

Document for: Discussion and Decision

# Antenna switching up to 8Rx

## Resource set configurations

***FL proposal 3-1:***

* *For aperiodic antenna switching SRS, support to configure N <=N\_max resource sets, where totally K resources are distributed in the N resource sets flexibly based on RRC configuration.*
* *For 1T6R, K=6, N\_max = [4], and each resource has 1 port.*
* *For 1T8R, K=8, N\_max = [4], and each resource has 1 port.*
* *For 2T6R, K=3, N\_max = [3], and each resource has 2 ports.*
* *For 2T8R, K=4, N\_max = [4], and each resource has 2 ports.*
* *For 4T8R, K=2, N\_max = [2], and each resource has 4 ports.*
	+ *FFS other configurations considering UE coherence capability*
* *At least more than one candidate value for N is supported for each xTyR. FFS the supported candidate values.*
* *FFS extension to increase N\_max for 1T4R, 2T4R, T=R and 1T2R cases*
* *FFS the number of resources and resource sets for semi-persistent and periodic antenna switching SRS*

Companies’ further views are collected as follows.

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| Companies | Views |
| InterDigital | We cannot agree to the proposed configuration for 4T8R. We would like to have further study to consider the impact of UE coherency capability for supporting this configuration. For now, we could agree to the following,

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| Ÿ   *For 4T8R,*n   *For fullAndPartialAndNonCoherent UEs, K=2, N\_max = 2, and each resource has 4 ports.*n   *FFS for* *partialAndNonCoherent and nonCoherent UEs* |

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| Intel | Regarding Proposal 3-1, it’s still not very clear why UE coherence capability has impact on SRS resource configuration for antenna switching. For non-coherent UE with 4T8R, how many resources/resource set/port per resource is expected? In addition, if the UE coherence capability has impact on antenna switching design, why it is only for 4T8R case? Hope this can be further clarified. One more comment on Proposal 3-1 is about the bullet of FFS on the extension to increase N\_Max, why the case ‘T=R’ is included? For T=R, only one SRS resource is enough, how many resource sets will be extended to? |

# Coverage and capacity enhancements

***FL Proposal 4-1:*** *For Rel-17 SRS capacity and coverage enhancement, support the following*

* *Increase the maximum number of repetition symbols in one slot and one SRS resource to S*
	+ *Support at least one S value from {8, 10, 12, 14}*
		- *FFS other candidate values*
* *Support to transmit SRS only in* $\frac{1}{P\_{F}}m\_{SRS, B\_{SRS}}$ *contiguous RBs in one OFDM symbol, where* $m\_{SRS, B\_{SRS}}$ *indicates the number of RBs configured by BSRS and CSRS*
	+ *Support at least one PF value from {2, [3], 4, 8}*
		- *FFS other candidate values, e.g., non-integer values for PF*
	+ *Note: SRS sequence shorter than the minimum length supported in the current specification is not pursued.*
	+ *FFS it is applicable to frequency hopping only, or both frequency hopping and non-frequency hopping*
	+ *FFS detailed signaling mechanism to determine PF and the location of the* $\frac{1}{P\_{F}}m\_{SRS, B\_{SRS}} $*RBs, potentially taking non-frequency hopping case into account*
* *Support Comb 8*
	+ *Note: SRS sequence shorter than the minimum length supported in the current specification is not pursued.*
* *Support omitting SRS transmission on the whole* $m\_{SRS, B\_{SRS}}$ *RBs in a frequency hop*
* *FFS whether and if needed, how to use harmonized approach to define the three supported schemes*
* *Note: other schemes for SRS capacity and coverage enhancements are not supported in Rel-17.*

Companies’ further views are collected as follows.

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| --- | --- |
| Companies | Views |
| Futurewei |  As we commented before, the capability of dynamically changing the SRS BW in the non-hopping case is quite important but cannot be supported by existing standards.  Therefore, we prefer not to state non-frequency hopping as FFS/potentially. Our suggested proposal is:Possible agreement (Proposal 4-1)*For Rel-17 SRS capacity and coverage enhancement, support the following*Ÿ   *Increase the maximum number of repetition symbols in one slot and one SRS resource to S*-         *Support at least one S value from {8, 10, 12, 14}*Ÿ   *FFS other candidate values*Ÿ   *Support to transmit SRS only in*  *contiguous RBs in one OFDM symbol, where  indicates the number of RBs configured by BSRS and CSRS*-         *Support at least one PF value from {2, [3], 4, 8}*Ÿ   *FFS other candidate values, e.g., non-integer values for PF*-         *Note: SRS sequence shorter than the minimum length supported in the current specification is not pursued.*-         *~~FFS it is~~ applicable to ~~frequency hopping only, or~~ both frequency hopping and non-frequency hopping*-         *FFS detailed signaling mechanism to determine PF and the location of the RBs, ~~potentially~~includingtaking non-frequency hopping case into account*Ÿ   *Support Comb 8*-         *Note: SRS sequence shorter than the minimum length supported in the current specification is not pursued.*Ÿ   *Support omitting SRS transmission on the whole  RBs in a frequency hop*Ÿ   *FFS whether and if needed, how to use harmonized approach to define the three supported schemes*Ÿ   *Note: other schemes for SRS capacity and coverage enhancements are not supported in Rel-17.* |
| OPPO | For the new updated version of Proposal 4-1, we cannot accept it. As we commented before, one solution for capacity enhancement and another solution for coverage enhancement are sufficient for Rel-17. We don’t see any the benefit to introduce duplicated features for the same purpose. Thus, we only support up to 2 schemes for this topic. We compromised to accept the previous proposal 4-1  that supports 3 schemes just for the sake of progress. However, more scheme is added in the new version, which is not acceptable for us.  Approving a huge package with multiple duplicated features is not a good way for the technical perspective.Regarding to the deleted parts, we suggest to keep them as we have lots of questions on bullet#2. For the sake of progress, we can discuss it later but we need to keep the FFS parts to reflect the fact that we haven’t achieved any agreements on some sub-topics. |
| Intel | Regarding Proposal 4-1, support OPPO’s view on the modification to the second bullet. We are fine with the original version of the second bullet. |

# Conclusion