**3GPP TSG RAN WG1 Meeting #114 R1-230xxxx**

Toulouse, France, August 21 – 25, 2023

**Agenda item: 9.17**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Summary on email discussion on** **NR Enhanced Positioning**

**Document for: Discussion and Decision**

# 1 Introduction

This thread will discuss the draft CR to 38.214 for the NR Enhanced Positioning.

First checkpoint for this discussion: **September 5, 6:00 UTC**!

# 2 Discussion – first round

The comments in this section are based on version 0 of the the draft CR available in the **Post RAN1#114 discussion.**

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| Company | Comments | Editor reply/Notes |
| Intel | * **Comment #1**

In subclause 5.1.6.5, the RSCP and RSCPD need to be swapped as indicated below:

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| When the UE reports DL RSCPD measurement(s) along with DL RSTD measurement(s) or DL RSCP measurement(s) along with UE Rx-Tx time difference measurement(s), the DL RSCPD and/or DL RSCP measurement(s) should be measured from a single DL PRS positioning frequency layer.  |

* **Comment #2**

In subclause 5.1.6.5, suggest that the following sentence be removed – as discussed as part of review of draft CR for 38.215, it can be captured in RAN4 specs.

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| The UE is not expected to obtain more than 1 DL RSCP or DL RSCPD measurement sample in a single measurement instance. |

* **Comment #3**

In subclause 5.1.6.5, for the following sentence, suggest to add “subject to UE capability” as per the agreement

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| When the UE reports a timestamp associated with a DL RSCP measurement or a DL RSCPD measurement, subject to UE capability, it may include a symbol index in the timestamp. |

* **Comment #4**

In subclause 6.2.1.4, For the following suggest couple of updates indicated below for improved readability.

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| The reduced capability UE transmit frequency hopping is configured within one SRS resource for positioning that may be configured with a bandwidth larger than the maximum bandwidth of the reduced capability UE, in RRC\_CONNECTED or RRC\_INACTIVE mode. The reduced capability UE transmit frequency hopping may be configured with overlapping or non-overlapping frequency hops in the frequency domain. When the reduced capability UE is configured to perform transmit frequency hopping it expects to be configured via [higher layer parameter] with the starting PRB of the first frequency hop. |

* **Comment #5**

Option 1 in the following agreement needs to be captured in Clause 6.2.1.4. **Agreement**With regard to aperiodic positioning SRS for bandwidth aggregation for UEs in RRC\_CONNECTED state, support both Option 2 and Option1.* Option 2: Support to use a DCI format 0\_3 or 1\_3 for multi-cell PDSCH/PUSCH scheduling to trigger SRS resources for bandwidth aggregation in multiple CCs.
* Option 1: Support a Rel-17 single DCI scheduling positioning SRS resource sets across the linked carriers, as a separate UE capability.
	+ Reuse Rel-17 DCI framework without modification.
	+ If a single DCI indicates transmission of an aperiodic positioning SRS resource set, UE transmits aperiodic positioning SRS resource sets across all linked carriers for bandwidth aggregation.
* **Comment #6**

Based on the agreement, if SRS in one of aggregated carriers is dropped in a symbol, UE will drop SRS transmission in other CCs. The following highlighted text may need to be updated as “if an SRS transmission in one of the CC is dropped” as it is not always the case that UE will drop SRS transmission (e.g., for A-SRS transmission for positioning) if SRS collides with other signals/channels.

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| For the linked SRS resource sets for bandwidth aggregation across CCs, if an SRS configured by the higher layer parameter SRS-PosResource collides with other signals or channels on a symbol, SRS transmission of the linked SRS resource sets across all CCs is dropped on that symbol. |

* **Comment #7**

In subclause 8.2.4.1.1, we suggest to remove “For comb sizes of 1, 2, 4” in the last bullet as there is no such restriction for TDM’ed multiplexing between PSSCH and SL PRS. Adding it would be redundant since only comb sizes of 1, 2, 4 are supported for SL PRS in shared resource pool. In addition, based on the following working assumption, SL PRS is transmitted in the last M consecutive symbols considering all other restrictions including PSFCH. Lastly, we also suggest to add a placeholder after “in parameter” in the first bullet similar to what is currently captured for dedicated resource pool.

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| - the UE shall transmit SL PRS only after the last symbol with second stage SCI .- For a given value of ‘M’, SL PRS resource is mapped to the last consecutive ‘M’ SL symbols in the slot that meet the other restrictions- For comb sizes of 1, 2, 4, the UE shall not transmit PSSCH and SL PRS in the same symbol.]For a shared resource pool, the UE shall not transmit SL PRS in symbols where PSFCH is transmitted. |

We suggest to update the above text as follows:

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| - the number of contiguous symbols for SL PRS transmission, ‘M’, shall correspond to one of the SL PRS resources in parameter [TODO]~~.~~- the UE shall not transmit SL PRS in symbols where associated PSCCH is transmitted- the UE shall not transmit SL PRS and PSSCH DMRS in the same symbol~~.~~- the UE shall transmit SL PRS only after the last symbol with second stage SCI~~.~~- the UE shall not transmit SL PRS in symbols where PSFCH is transmitted-~~- For comb sizes of 1, 2, 4,~~ the UE shall not transmit PSSCH and SL PRS in the same symbol- ~~F~~for a given value of ‘M’, SL PRS resource is mapped to the last consecutive ‘M’ SL symbols in the slot that meet the other restrictions.~~- - For comb sizes of 1, 2, 4, the UE shall not transmit PSSCH and SL PRS in the same symbol.]~~~~For a shared resource pool, the UE shall not transmit SL PRS in symbols where PSFCH is transmitted.~~ |

**Working assumption**For a shared resource pool,* Explicit (pre-)configuration of SL PRS resources in a slot, applicable for an indicated frequency domain allocation, includes:
	+ SL PRS Resource ID, (M, N) pattern, comb offset.
* For a given value of ‘M’, SL PRS resource is mapped to the last consecutive ‘M’ SL symbols in the slot that can be used for SL PRS, i.e., taking into consideration multiplexing with PSSCH DMRS, PT-RS, CSI-RS, PSFCH, gap symbols, AGC symbols, PSCCH in the slot
* The maximum number of SL PRS resources in a slot of a shared resource pool that can be (pre-)configured is FFS.
* **Comment #8**

It is not clear the meaning of “within parameter”. We suggest to add a placeholder for the higher layer parameter as done elsewhere “that is provided by [*higher-layer-parameter*]”.

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| The first SL PRS resource is determined according to the sub-channel used for the PSCCH transmission containing the associated SCI format 1-B: The index of the sub-channel in the resource pool is identical to the index of the SL PRS resource ~~within parameter~~ that is provided by [*higher-layer-parameter*]. |

* **Comment #9**

It appears that the following agreements are not captured in 211 or 214 and we think 214 would be the right place for these.

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| **Agreement**At least for dedicated SL PRS resource pools, in addition to already-agreed (M, N) = (2, 2), (4, 4), fully staggered pattern with (M, N) = (6, 6) is supported. * FFS: Other values of (M, N).
* FFS: Applicability to shared resource pools.

AgreementFor a dedicated resource pool, the maximum number of TDM groups for TDM-based multiplexing of SL PRS within a slot is 4.* Maximum number 4 only applies to the case of comb-2

AgreementFor SL PRS in a dedicated or shared resource pool, for a given valid comb size ‘N’, partially staggered SL PRS patterns (M, N) are supported for all integer values of ‘M’ such that (M, N) = (1, 2) or (2, 4). |

* **Comment #10**

In section 8.2.4.1.1, suggest the following modification, otherwise it looks inaccurate:* A UE does not transmit on multiple SL PRS resources in the same slot
* **Comment #11**

In section 8.2.4.1.1, there is a typo “asubject” -> “subject” which is visible when markups are switched off:* For a dedicated resource pool, UE shall transmit SL PRS ~~a~~subject to the following restrictions:
* **Comment #12**

In section 8.2.4.1.2, the second sentence is not completely accurate since there is no definition of FDRA of a resource pool. Suggest the following modification:For a dedicated resource pool, the frequency domain resource assignment of a SL PRS resource is same as frequency resources of a resource pool ~~the same as the resource pool~~ |  |
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