**3GPP TSG-RAN WG4 Meeting #112 R4-241xxxx**

**Maastricht, Netherlands, August 19 ‒ 23, 2024**

**Title:** WF on SL positioning and carrier phase positioning

**Agenda Item:** 6.1.3

**Source: CATT**

**Document for:** Approval

# Introduction

This WF includes the agreements and open issues discussed in topic summary for [112][211] NR\_pos\_enh2\_part2.

# Topic #1: Sidelink Positioning Requirements

## Sub-topic 1-1 SL Positioning Core Requirements Maintenance (agenda 6.1.1.2)

### Issue 1-1-1: End point of SL-PRS based RSTD measurement period requirements

*Conclusion:*

* + - No common understanding on RAN2 procedure for reporting behaviour. Companies check offline.
		- No consensus at the moment to revisit previous agreement

### Issue 1-1-2: Impact of Uu link connect

The issue is resolved already by adding Note 3 in the introduction part of SL positioning section in the latest version of specification.

### Issue 1-1-3: Measurement period requirements for SL PRS-RSRP(P)

*Agreements:*

* + - Update the measurement period definition of SL PRS-RSRP and SL PRS-RSRPP to refer to SL RSTD, SL Rx-Tx, SL AoA, and SL RTOA, depending on which of them the SL PRS-RSRP and SL PRS-RSRPP measurements are configured.

## Sub-topic 1-2 SL Positioning Performance Requirements (agenda 6.1.2.2)

### Issue 1-2-1: RF calibration margin for SL RSTD/Rx-Tx

*Agreements:*

* + Reuse the RF calibration margins defined for Uu positioning for SL RSTD and SL Rx-Tx:
		- * The RF calibration margin for SL RSTD measurements in FR1:

|  |  |
| --- | --- |
| *PRS BW (RB number)* | *Margin (Tc)* |
| *SCS=15kHz* | *SCS=30kHz* | *SCS=60kHz* |
| *≥ 48* | *≥ 24* | *N/A* | ***Z1=72*** |
| *≥ 96* | *≥ 48* | *≥ 24* | ***Z2=36*** |

* + - * The RF calibration margin for SL Rx-Tx measurements in FR1:

|  |  |
| --- | --- |
| *[Min(SL PRS Rx BW, SL PRS Tx BW) (RB)]* | *Margin (Tc)* |
| *SCS = 15 kHz* | *SCS = 30 kHz* | *SCS = 60 kHz* |
| *≥ 48* | *≥ 24* | *N/A* | ***δ1=80*** |
| *≥ 96* | *≥ 48* | *≥ 24* | ***δ2=56*** |

### Issue 1-2-2: Frequency drift margin for SL Rx-Tx measurement

*Agreements:*

* + The frequency drift margin for SL Rx-Tx is defined as Y=32 Tc, provided that the time offset between the SL PRS transmission and reception, which are used for a single SL Rx-Tx estimate, is no greater than 160 ms.

### Issue 1-2-3: General aspects for measurement accuracy requirements for SL positioning

*Agreements:*

* On SL-PRS bandwidth 24 PRBs with 15 kHz SCS in the accuracy requirements for SL RSTD and SL Rx-Tx measurements:
	+ This case was not simulated, the performance can be worse than legacy.
	+ Do not include 24 PRBs in Rel-18 accuracy requirements for SL positioning.
* The following band groups are included in the accuracy requirements for SL positioning and in the conditions for NR SL-PRS based measurements:
	+ NR\_TDD\_FR1\_B,
	+ NR\_TDD\_FR1\_C,
	+ NR\_FDD\_FR1\_G,
	+ NR\_TDD\_FR1\_J.

### Issue 1-2-4: Measurement accuracy for SL PRS-RSRP(P)/Rx-Tx

*Agreement:*

* + Accuracy requirements:
		- The numbers refer to the simulation summary (R4-2410196) where the accuracies have been derived.

### Issue 1-2-5: Delay and accuracy TCs for SL PRS-RSRP(P)

*Agreements:*

* Whether to verify the accuracy of legacy measurements in SL RSRP(P) TCs
	+ - verify only the accuracy of SL PRS-RSRP/RSRPP
	+ For SL RSRP(P) delay TCs:
		- a new TC with both measurements, but add a clarification that the UE is tested only once for RSTD/Rx-Tx
			* For UE supporting SL RSTD + SL PRS-RSRP, it is sufficient the UE passes the TC with both measurements
			* For UE supporting SL Rx-Tx + SL PRS-RSRPP, it is sufficient the UE passes the TC with both measurements
	+ For SL RSRP(P) accuracy TCs:
		- a new TC with both measurements, but add a clarification that TE verifies only the accuracy of SL PRS-RSRP/RSRPP
			* For UE supporting SL RSTD + SL PRS-RSRP, it is sufficient the UE passes the TC with both measurements
			* For UE supporting SL Rx-Tx + SL PRS-RSRPP, it is sufficient the UE passes the TC with both measurements

### Issue 1-2-6: SL-PRS signal level configurations

*Agreements:*

* Check the RAN1 specification and the Uu TCs in relation to overlapping SL-PRS from different UEs. Further discuss the options:
	+ Option 1: overlapping SL-PRS can be used in TCs.
	+ Option 2: overlapping SL-PRS should not be used in SL TCs.

### Issue 1-2-7: SL-PRS bandwidth configurations in TCs

*Agreements:*

* Update the bandwidth of SL-PRS configurations as follows:

|  |  |  |
| --- | --- | --- |
| RB numbers containing SL PRS within channel Bandwidth Note 1 | [24~~48~~] | [48~~96~~] |

* BW for accuracy TCs: 24 and 48 RBs.
* BW for delay TCs: 48 RBs.

### Issue 1-2-8: Other test case configurations

*Agreements:*

* FFS: Shared and dedicated resource pools are randomly used among different TCs.
* FFS: (symbol num, comb size): (4, 4) and (2, 4).

### Issue 1-2-9: Spec structure for SL-PRS test configuration

*Agreements:*

* The following specification clause numbers are updated:
	+ - A.3.21A NR Sidelink Measurements for Positioning
		- A.3.21A.1 Introduction
		- A.3.21A.2 NR SL-PRS configurations
		- A.3.21A.2.1 NR SL-PRS configurations for FR1

# Topic #2: Carrier Phase Positioning Requirements

## Sub-topic 2-1 Carrier Phase Positioning Core Requirements Maintenance (agenda 6.1.1.2)

### Issue 2-1-1: Measurement period requirements for DL RSCP/DL RSCPD with aperiodic time window

*Agreements:*

* Define the requirement for one-shot window.
* The requirement is defined by taking the time window length + processing time.

### Issue 2-1-2: Measurement period requirements for DL RSCP/DL RSCPD with periodic time window with multiple PFLs configured

*Agreements:*

* RAN4 to clarify that the application of the periodic time window is limited to the PFL indicated for CPP measurement.

### Issue 2-1-3: The impact of carrier frequency offset

See agreements in Issue 2-2-2.

## Sub-topic 2-2 Carrier Phase Positioning Performance Requirements (agenda 6.1.2.6)

### Issue 2-2-1: Whether to verify the accuracy of legacy measurements in RSCPD/RSCP TCs

*Agreements:*

* For the CPP test case, both RSTD/Rx-Tx measurement and CPP reporting are configured, and TE check the success rate for CPP reporting.
* If UE supports CPP measurement, UE shall also pass the test case for RSTD/Rx-Tx measurement.

### Issue 2-2-2: Additional margins due to frequency drift and RF calibration

*Agreements:*

* RAN4 to clarify that the RSCPD accuracy requirement and the relative RSCP accuracy requirement apply given that the carrier phase measurements are performed on PRS resources within a slot/a set of symbols, which can be controlled at least by the window configuration.
* Companies can bring proposals on other scenarios in WI performance maintenance phase.

# Reference

1. R4-2411806, Topic summary for [112][211] NR\_pos\_enh2\_part2, CATT, RAN4#112.
2. R4-2413873, Ad-hoc minutes #1 for NR\_pos\_enh2 WI, Ericsson, RAN4#112.
3. R4-2413874, Ad-hoc minutes #2 for NR\_pos\_enh2 WI, Ericsson, RAN4#112.
4. R4-2413873, Ad-hoc minutes #3 for NR\_pos\_enh2 WI, Intel, RAN4#112.