**3GPP TSG-RAN WG4 Meeting # 104-e R4-2214492**

**Electronic Meeting, August 15 – August 26, 2022**

**Title:** WF on NR Positioning Enhancements (Part 2)

**Agenda item:** 9.19.3

**Source:** CATT

**Document for:** Approval

# Topic #1: R17 ePOS core requirements maintenance

## Sub-topic 1-1 UE Rx/Tx and/or gNB Rx/Tx timing delay mitigation

Issue 1-1-1 to issue 1-1-6 are related to RAN1 LS R4-2211503 (R1-2205382)

### Issue 1-1-1 RAN1’s understanding on issue #2 is correct?

*Agreements:*

* RAN1’s following understanding on issue #2 is correct.
	+ - The applicability of a reported UE/TRP Rx/RxTx TEG is limited to the measurements contained within the single measurement instance of a measurement report in which the Rx/RxTx TEG information is provided, and only to measurements that are tagged with the corresponding Rx/RxTx TEG ID.

### Issue 1-1-2 RAN1’s understanding on issue #5 is correct?

*Agreements:*

* Response to RAN1: RAN4 has the same understanding on issue #5.

### Issue 1-1-3 RAN1’s understanding on issue #7 is correct?

*Agreements:*

* RAN1’s understanding on issue #7 is correct.

### Issue 1-1-4 Whether UE Rx/RxTx TEG margins are provided to LMF as UE capability, or as LPP signalling parameters outside of UE capability signaling (issue #6)?

*Agreements:*

* UE Tx/Rx/RxTx TEG margins are provided to LMF as LPP signaling parameters outside of UE capability signaling.

### Issue 1-1-5 If option 1 is agreed in issue 1-1-4, whether a single timing error margin value is provided per Rx TEG/RxTx TEG type in a single LPP message, even if it has multiple measurement instances (issue #6)?

*Agreements:*

* A single timing error margin value is provided per Rx TEG/RxTx TEG type per measurement instance in a single LPP message, if it has multiple measurement instances.

### Issue 1-1-6 If option 1 is agreed in issue 1-1-4, whether the timing error margin values for an Rx TEG/RxTx TEG type in different LPP messages can be different (issue #6)?

*Agreements:*

* The timing error margin values for an Rx TEG/RxTx TEG type in different LPP messages can be different.

### Issue 1-1-7 PRS measurement period related to TEG indication (when LMF indicates ‘n0’ in measureSameDL-PRS-ResourceWithDifferentRxTEGs)?

*Agreements:*

* When LMF indicates ‘n0’ when requesting UE to measure same DL PRS resource with multiple Rx TEGs, the scaling factor is based on the number of Rx TEGs UE can support for measurement of same DL PRS resource, which is reported in *NR-UE-TEG-Capability*.

## Sub-topic 1-2 Measurement in RRC\_INACTIVE state

#### Issue 1-2-1 PRS collision with PDSCH in RRC\_INACTIVE state

*Way forward:*

* Option 1: (CMCC, Huawei)
	+ For PRS collision with PDSCH in RRC inactive state, in order not to miss paging, UE shall wait for receiving the PDSCH symbols other than retuning to PRS resources even the DCI is too close to the PRS symbols,
	+ and the PRS measurement period can be extended when there is collision with PDSCH
* Option 2: (Qualcomm)
	+ When the UE is performing positioning measurements in inactive state, if the UE determines that other higher priority DL signals/channels collide with PRS (as defined previously by RAN4) later than [N symbol/T ms] before the collision starts, the UE is not required to receive the other higher priority DL signals/channels and may receive the PRS resources (RAN1 conclusion)

#### Issue 1-2-2 PRS measurement window in RRC\_INACTIVE state

*Way forward:*

* Requirements for PRS measurement in INACTIVE apply provided that all PRS resources within a PFL are configured within up to [2] separate windows within [Tavailable], where each window is up to [5 or 10] ms.
	+ FFS on the location of windows.
	+ FFS on whether there is impact on signalling

# Topic #2: R17 ePOS performance requirements related to TEG

## Sub-topic 2-1 Timing error margin

#### Issue 2-1-1 Applicability of timing error margin of Rx TEG?

*Agreements:*

* For Rx TEG, the applicable timing error margin values that can be selected by the UE are the pre-defined values that are not larger than the sum of the Rel-16 group delay margin (dependent on PRS/SRS BW) and frequency drift margin.

#### Issue 2-1-2 Candidate timing error margin for RxTx TEG?

*Agreements:*

* (16 values): 1/2 Tc, 1 Tc, 2 Tc, 4 Tc, 8 Tc, 12 Tc, 16 Tc, 20 Tc, 24 Tc, 32 Tc, 40 Tc, 48 Tc, 64 Tc, 80 Tc, 96 Tc, 128 Tc.
* The applicable timing error margin values that can be selected by the UE are the pre-defined values that are not larger than the sum of twice the Rel-16 group delay margin (dependent on PRS/SRS BW) and frequency drift margin
	+ FFS on the frequency drift margin
	+ FFS on “sum of twice the Rel-16 group delay margin and frequency drift margin”

#### Issue 2-1-3 How to form the accuracy numbers for RSTD/UE Rx-Tx (i.e. whether to capture timing error margin separately)?

*Agreements:*

* Follow the discussion in email thread #201.

## Sub-topic 2-2 Performance requirements with TEG

#### Issue 2-2-1 RSTD measurement accuracy requirements with TEG?

*Agreements:*

* For RSTD measurements where the reference cell and neighbour cell TOAs belong to the same Rx TEG, absolute measurement accuracy requirements are defined as the sum of the baseband accuracy derived from simulations and the Rx TEG timing error margin.

#### Issue 2-2-2 Whether to define UE Rx-Tx accuracy and test case related to TEG?

*Agreements:*

* Define relative UE Rx-Tx accuracy requirements and corresponding test cases for the case where two measurements are in same RxTx TEG based on side condition with one cell is -6dB the other is -13dB by using the absolute RSTD simulation results from Rel-16.

#### Issue 2-2-3 How to define UE Rx-Tx accuracy related to TEG?

*Agreements:*

* Follow the agreement in Issue 2-2-2.

#### Issue 2-2-4 Reporting condition for RSTD/UE Rx-Tx measurement?

*Agreements:*

* No need to define the reporting condition for RSTD and UE Rx-Tx measurement.

#### Issue 2-2-5 How to define the test case related to TEG?

*Agreements:*

* UE should not be mandated to use the same TEG to perform the measurement on both cells during the test.
* For UE Rx-Tx test and RSTD enhanced accuracy test
	+ Rel.16 setup can be reused to define test case for TEG based UE Rx-Tx/RSTD measurement accuracy requirement.
	+ Rel.16 setup shall be updated to support UE reported RxTx TEG/Rx TEG margin value and UE is expected to meet the accuracy requirement corresponding to the RxTx TEG/Rx TEG to pass the test.
	+ Applicability rules for UE Rx-Tx/RSTD accuracy test case are not precluded.

# Reference

1. R4-2214277 Email discussion summary for [104-e][226] NR\_pos\_enh\_2, CATT, RAN4#104-e
2. R4-2211503 (R1-2205382), Reply LS on the UE/TRP TEG framework, RAN1