3GPP TSG RAN WG2 Meeting #119-e Draft R2-220xxxx

**Electronic meeting, 17- 29 Aug, 2022**

**Agenda item:** 6.11.1

**Source:** Intel Corporation

**Title:** Report of [AT119-e][409][POS] Rel-17 positioning capabilities (Intel)

**Document for:**  Discussion and decision

# Introduction

This is the report of following offline discussion:

* [AT119-e][409][POS] Rel-17 positioning capabilities (Intel)

      Scope: Check and update the rapporteur CR in R2-2207385 to take account of decisions of this meeting.  Evaluate the proposals in the following tdocs:

* R2-2208492

      Intended outcome: Agreeable CR

      Deadline: Tuesday 2022-08-23 1200 UTC

I would like to split the discussion into two phases:

**Phase 1**: to provide your view on issues;     Deadline:  Saturday 2022-08-20 1800 UTC

**Phase 2**: To check TPs; Deadline:  Tuesday 2022-08-23 1200 UTC

Following stage 2 changes are discussed in the offline discussion:

R2-2207385 Corrections on LPP capabilies Intel Corporation

R2-2208492 Change request about UE capability for PRS measurement within a PPW vivo

P3 of R2-2208792 (Summary of AI 6.11.2.1) Qualcomm

# Annex: companies’ point of contact

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| --- | --- | --- |
| **Company** | **Point of contact** | **Email address** |
| Intel Corporation | Yi Guo | Yi.guo@intel.com |
| vivo | Xiang Pan | panxiang@vivo.com |
| ZTE | Yu Pan | pan.yu24@zte.com.cn |
| CATT | Jianxiang Li | lijianxiang@catt.cn |

# Discussion

## Changes from R2-2207385 Corrections on LPP capabilies Intel Corporation

***Reason for change:***

Based on RAN1 latest feature list in R1-2205607 and RAN4 R4-2211189, the Prerequisite feature groups and some clarifications for following LPP capabilities are missing:

27-1-1 nr-UE-RxTEG-ID-MaxSupport-r17

27-1-2/27-1-2a nr-UE-TxTEG-ID-MaxSupport-r17

27-1-3 nr-UE-RxTxTEG-ID-MaxSupport-r17

27-1-4 measureSameDL-PRS-ResourceWithDifferentRxTEGs-r17

27-1-4a measureSameDL-PRS-ResourceWithDifferentRxTEGsSimul-r17

27-2-1 maxDL-PRS-FirstPathRSRP-MeasPerTRP-r17 (in addition, restriction “The maximum number of first path PRS RSRP per TRP should be less than or equal to the maximum number of PRS RSRP (27-2-2)” should be added;)

27-2-2 maxDL-PRS-RSRP-MeasurementFR1-r17, maxDL-PRS-RSRP-MeasurementFR2-r17

27-3-1 supportedDL-PRS-ProcessingSamples (In addition, a note should be added as

Note: this feature is supported for both UE-assisted and UE based positioning

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27-3-2

prs-ProcessingWindowType1A-r17

prs-ProcessingWindowType1B-r17

prs-ProcessingWindowType2-r17

(A note should be added as Note: Within a PRS processing window, UE measurement is inside the active DL BWP with PRS having the same numerology as the active DL BWP)

27-3-3 prs-ProcessingCapabilityOutsideMGinPPW (no change is needed)

27-4-1 nr-los-nlos-AssistanceDataSupport-r17 (in addition, a Note should be added as NOTE: A single value is reported when both Multi-RTT and DL-TDOA are supported.)

27-6 (no change is needed)

dl-PRS-BufferType-RRC-Inactive-r17

durationOfPRS-Processing-RRC-Inactive-r17

maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive-r17

27-7 (no change is needed)multiMeasInSameMeasReport-r17

27-8 nr-PosCalcAssistanceSupport-r17 (bit 3 DL-TDOA, bit 2 DL-AoD, )

27-9 (no change is needed) lowerRxBeamSweepingThan8-FR2-r17

27-10a mg-ActivationRequest-r17

27-12 nr-los-nlos-IndicatorSupport-r17(no change is needed)

27-13 additionalPathsExtSupport-r17(no change is needed)

27-13a supportOfDL-PRS-FirstPathRSRP-r17

27-14 additionalPathsExtSupport-r17(no change is needed)

27-14a supportOfDL-PRS-FirstPathRSRP-r17

27-15 posSRS-RRC-Inactive-InInitialUL-BWP-r17(no change is needed)

27-15b posSRS-RRC-Inactive-OutsideInitialUL-BWP-r17 (in addition, some notes should be added

Note 2: If component 9 is not signaled, the UE only supports same center frequency between the SRS for positioning and initial UL BWP

 Note 3: If component 5 is not signaled, the UE only supports same numerology between the SRS and the initial UL BWP

Note 4: If component 6 is not signaled, the UE supports only SRS BW that include the BW of the CORESET #0 and SSB.

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27-15a maxNumOfSemiPeristentSRSposResources-r17 maxNumOfSemiPersistentSRSposResourcesPerSlot-r17

27-15c maxNumOfSemiPeristentSRSposResources-r17 maxNumOfSemiPersistentSRSposResourcesPerSlot-r17

27-16a

 olpc-SRS-PosRRC-Inactive-r17

27-18a/27-18b/27-18c dl-PRS-MeasRRC-Inactive-r17

27-19a

spatialRelationsSRS-PosRRC-Inactive-r17

27-20 dl-PRS-ResourcePrioritySubset-Sup-r17 (no change is needed)

27-21 nr-DL-PRS-BeamInfoSup-r17(no change is needed)

27-22 nr-PosCalcAssistanceSupport-r17, beamInfoSup(no change is needed)

14-2 supportedDL-PRS-ProcessingSamples-RRC-Inactive-r17

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***Summary of change:***:

To add the Prerequisite feature groups for LPP capabilities introduced in Rel-17 and corresponding clarifications based on RAN1/RAN4 latest feature list in R1-2205607 and R4-2211189

***Consequences if not approved:***

It is unclear on how to set the LPP capabilities.

**Moderator’s comments**:

* It is to align with latest RAN1/4 feature lists;

 Moderator would like to check companies’ view:

**Discussion point 3.1: Do you agree the changes in R2-2207385?**

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| --- | --- | --- |
| **Company’s name** | **Yes or No?** | **Comments, if any** |
| ZTE | Yes |  |
| Qualcomm | Yes | In all field descriptions, the -r16/-r17 suffix should be removed.New field names should be Italic Font in ***posSRS-RRC-Inactive-InInitialUL-BWP, posSRS-RRC-Inactive-OutsideInitialUL-BWP, olpc-SRS-PosRRC-Inactive, nr-PosCalcAssistanceSupport*** |
| CATT | Yes | There are still some editorials, e.g. the names of parameters are not italic. Can double check and correct them. |
| Huawei, HiSIlicon | Yes |  |

## Changes from R2-2208492 Change request about UE capability for PRS measurement within a PPW vivo

***Reason for change:***

According to RAN4 LS R2-2206945, RAN2 needs to introduce the UE capability for support of Rx timing difference between the serving cell and non-serving cell for PRS measurement within a PPW in *NR-DL-PRS-ProcessingCapability* of TS 37.355. The capability type shall be per band.

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| * The applicability condition on Rx timing difference between the serving cell and a neighbor cell/TRP for PRS measurements within a PPW is $max \left|∆T\right|\leq THR$, where
	+ $∆T$ is the time difference between the start of a slot containing PRS from the neighbor cell/TRP and the start of the closest slot from the serving cell, , and
	+ the range of $∆T$ is determined by the expected RSTD and expected RSTD uncertainty in the assistance data.
	+ $THR$ is the threshold, which is up to UE capability (as already informed in R4-2206981)
* The candidate values for $THR$ include {CP length, ¼ symbol length, ½ symbol length, ½ slot length}
 |

***Summary of change:***:

Introduce a new UE capability for support of Rx timing difference between the serving cell and non-serving cell for PRS measurement within a PPW in *NR-DL-PRS-ProcessingCapability*;

***Consequences if not approved:***

Incomplete UE capability for PRS measurement.

**Moderator’s comments**:

The capability is indicated in RAN4 feature list as 14-3, and has been captured in RRC/306 based on latest RAN4 feature list. RAN4 did not agree to add this in LPP. Therefore I would suggest not to add it in LPP unless RAN4 requests us to do so.

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| 14. NR\_pos\_enh | 14-3 | PRS measurement without MG | Capability for the threshold used to be compared against with the Rx timing difference to determine whether the PRS from the non-serving cell satisfy the condition of PRS measurement outside MG. | 27-3-2 | yes |  |  | Per band | No | No | N/A | The candidate threshold values: CP length, 1/4 symbol, 1/2 symbol, half of slot |

 Moderator would like to check companies’ view:

**Discussion point 3.2: Do you agree the changes in R2-2208492?**

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| **Company’s name** | **Yes or No?** | **Comments, if any** |
| vivo |  | In 38.214, the UE behavior related to this capability is as follows:

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| The UE is not expected to measure the DL PRS outside the measurement gap if the expected received timing difference between the DL PRS from the non-serving cell and that from the serving cell, determined by the higher layer parameters *nr-DL-PRS-ExpectedRSTD* and *nr-DL-PRS-ExpectedRSTD-Uncertainty,* is larger than maximum Rx timing difference provided by [UE capability]*.* |

Only UE and LMF are aware of the expected RSTD of multiple TRPs. The capability can be used for LMF to determine which TRPs shall be included in the PRS configuration. Besides, we already have the *prs-ProcessingCapabilityOutsideMGinPPW-r17* in the LPP, it’s confusing why this new capability is excluded.Or do we need to LS to RAN4/RAN1 for clarification? |
| ZTE | Yes | Other RAN4 UE capabilities are captured in LPP so we think this should be included in LPP too |
| Qualcomm | Yes | Agree with Rapporteur that this is not captured in the RAN4 spread sheet for LMF. Agree with vivo on the need. Maybe include this issue in the LS to RAN1/4 [AT119-e][422][POS]? |
| CATT | Yes | We agree to add the capability in LPP to let LMF aware of the whole PRS measurement related capabilities. But it is ok for us to further check with RAN4 if most companies want. |
| Huawei, HiSilicon |  | An LS to RAN4 is OK for the purpose of clarification whether they intend to inform this caapability to the LMF. |

## (new added) Agreements on P3 from R2-2208792 (Summary of AI 6.11.2.1) Qualcomm

During online discussion, RAN2 agreed:

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| Proposal 3: The LPP CR R2-2207885, "Correction to the number of samples for PRS measurement in RRC\_INACTIVE", is an essential correction. RAN2 to discuss and decide:(a) whether to dummify the existing field of supportedDL-PRS-ProcessingSamples-RRC-Inactive-r17, and add a new field for the reducedDL-PRS-ProcessingSamples-RRC-Inactive-r17 as proposed in R2-2207885.(b) extend the ENUMERATED and dummify the existing values 'm1' and 'm2':ENUMERATED { dummy1, dummy2, ..., supported-v17xy } (c) make a non-backwards compatible ASN change as proposed in R2-2207580 [7]: ENUMERATED { supported }Discussion:Huawei proposed option a, but think option b would also be OK; they cannot accept option c.Samsung also support the proposal and prefer option a; they see not much difference between a and b in overhead, and find a more readable.CATT and ZTE prefer the NBC change in c.Apple think either a or b is fine.Intel and OPPO prefer option b.Qualcomm think we could avoid any ASN.1 change and just clarify the field description. They agree that the NBC solution in c is not desired.Agreement:The capability for supportedDL-PRS-ProcessingSamples-RRC-Inactive-r17 is modified to indicate only support in a backward compatible fashion. Details can be discussed in the LPP capability email discussion [409]. |

Based on the online discussion, following backward compatible approaches are possible:

(a) whether to dummify the existing field of supportedDL-PRS-ProcessingSamples-RRC-Inactive-r17, and add a new field for the reducedDL-PRS-ProcessingSamples-RRC-Inactive-r17 as proposed in R2-2207885.

(b) extend the ENUMERATED and dummify the existing values 'm1' and 'm2':

ENUMERATED { dummy1, dummy2, ..., supported-v17xy }

(d) (raised by Sven online): we may just clarify the field description. Moderator provides the example as

***supportedDL-PRS-ProcessingSamples-RRC-Inactive***

Indicates the UE capability for support of measurements based on measuring M=1 or M=2 samples (instances) of a DL-PRS Resource Set in RRC\_INACTIVE state. The UE indicates value “*m1*” or “*m2*” shall supports measurements based on both measuring M=1 or M=2 samples (instances) of a DL-PRS Resource Set in RRC\_INACTIVE state.

(e) others?

Moderator would like to check companies’ view:

**Discussion point 3.3: Which option do you prefer?**

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| **Company’s name** | **Option a, b or c?** | **Comments, if any** |
| ZTE | b | We think the field description change in c is a little bit unclear from spec writing perspective that UE can indicate both m1 or m2 for the same purpose. So we prefer change in b without any field description change. |
| Qualcomm | (b) or (d) | 1st preference (d)2nd preference (b) |
| CATT |  | We do not like to see any Rel-17 dummies in such early Rel-17 spec versions. Since this is capability related and NBC is allowed for this stage, we still prefer to correct it directly. Please note NBC is always allowed if all companies agreed even for a frozen version. But it is acceptable for us to adopt option d as a compromise. |
| Huawei, HiSilicon | (a) | The spec would be clean to reflect intention of the UE capability.We would also be fine to adopt another method to revise m1 to supported, and dummy m2, so that it readsENUMERATED { supported, dummy1, ... }  |

# Summary report and proposals

**For agreement:**

**Online discussion:**

# Reference

1. R2-2207385 Corrections on LPP capabilies Intel Corporation
2. R2-2208492 Change request about UE capability for PRS measurement within a PPW vivo
3. R2-2208792 (Summary of AI 6.11.2.1) Qualcomm