**3GPP TSG-RAN WG4 Meeting #99-e *R4-2108295***

**Electronic Meeting, 19-27 May, 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **2152** | **rev** | **1** | **Current version:** | **16.7.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:***  | PRS-RSRP measurement requirements |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_pos-Core |  | ***Date:*** | 2021-05-25 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | To complete remaining PRS-RSRP requirements |
|  |  |
| ***Summary of change:*** | Remaining PRS-RSRP requirements are defined and aligned with other positoning measurement requirements |
|  |  |
| ***Consequences if not approved:*** | PRS-RSRP requirements will remain incomplete and will be inconsistent with other positoning measurement requirements |
|  |  |
| ***Clauses affected:*** | 9.9.3, 9.9.3.5 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ... |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | This CR was endorsed in R4-2105745 at RAN4#98bis-e |

---------Start changes---------

### 9.9.3 PRS-RSRP measurements

#### 9.9.3.1 Introduction

The requirements in clause 9.9.3.5 shall apply provided the UE has received a message from LMF via LPP [34] requesting the UE to measure and report PRS-RSRP measurements defined in TS 38.215 [4].

#### 9.9.3.2 Requirements applicability

The requirements in clause 9.9.3 apply for periodic and triggered PRS-RSRP measurements, provided:

- PRS-RSRP related side conditions given in clause 10.1.24 are met for a corresponding Band.

#### 9.9.3.3 Measurement Capability

UE PRS-RSRP measurement capability is as indicated by the UE in *NR-DL-AoD-ProvideCapabilities* according to TS 37.355 [34].

#### 9.9.3.4 Measurement Reporting Requirements

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTIDCCH where TTIDCCH is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

The reported PRS-RSRP measurement values contained in measurement reports shall be based on the measurement report mapping requirements specified in clauses 10.1.24.3.

The PRS-RSRP measurement accuracy for all measured PRS resources shall be fulfilled according to the accuracy requriements specified in the clauses 10.1.24.

#### 9.9.3.5 Measurement Period Requirements

When the physical layer receives *NR-DL-AoD-ProvideAssistanceData* message and *NR-DL-AoD-RequestLocationInformation* message from LMF via LPP [34], the UE shall be able to measure multiple (up to the UE capability specified in Clause 9.9.3.3) PRS-RSRP measurements, defined in TS 38.215 [4], from configured PRS resources for configured TRPs on configured positioning frequency layers, within ms.

where

*i* is the index of positioning frequency layer,

L is total number of positioning frequency layers,

 is the periodicity of the PRS-RSRP measurement in positioning frequency layer *i*.

where

 is the carrier specific scaling factor for PRS-RSRP measurements specified in clause 9.1.5.2,

 is the scaling factor for Rx beam sweeping, and =1 if positioning frequency layer *i* is in FR1 and =8 if positioning frequency layer *i* is in FR2,

 is the time duration of available PRS to be measured in the positioning frequency layer i, and is calculated in the same way as PRS duration K defined in clause 5.1.6.5 of TS 38.214 [26],

 is the maximum number of DL PRS resources of positioning frequency layer i configured in a slot,

 is UE capability combination per band where N is a duration of DL PRS symbols in ms corresponding to *durationOfPRS-ProcessingSysmbols* in TS 37.355 [34] processed every T ms corresponding to *durationOfPRS-ProcessingSymbolsInEveryTms* in TS 37.355 [34] for a given maximum bandwidth supported by UE corresponding to *supportedBandwidthPRS* in TS 37.355 [34],

 is UE capability for number of DL PRS resources that it can process in a slot as indicated by *maxNumOfDL-PRS-ResProcessedPerSlot* in clause 6.4.3 of TS 37.355 [34],

 is the number of PRS-RSRP measurement samples and = 4,

  *= +* is the measurement duration for the last PRS-RSRP sample, including the sampling time and processing time,

 is the periodicity of PRS-RSRP measurement in positioning frequency layer *i*,

 corresponds to durationOfPRS-ProcessingSymbolsInEveryTms in TS 37.355 [34],

 the least common multiple between and ,

 is the maximum PRS resource periodicity among all PRS resources in positioning frequency layer i,

 is the measurement gap repetition period in positioning frequency layer i.

If positioning frequency layer *i* has more than one DL PRS resource set with different PRS periodicities, is the least common multiple of PRS periodicities among the DL PRS resource sets on frequency *i*.

Note: For the purpose of calculating TPRS,i, only the PRS resources fully or partially covered by the MG are considered.

If muting option 1 is applied, the periodicity of a PRS resource is scaled by Nmuting defined as below:

* If TPRS,i \* dl-PRS-MutingBitRepetitionFactor-r16 > 10240 ms
	+ - * Nmuting = 1 (effectively no type1 muting)
* else
	+ - * Nmuting = X \* dl-PRS-MutingBitRepetitionFactor-r16, where
			* X = min (L, 10240/(Tprs \* dl-PRS-MutingBitRepetitionFactor-r16 )) and
			* L is the size of NR-MutingPattern-r16 for mutingOption1-r16.

When PRS-RSRP measurements are configured for DL-AoD, the time starts from the first MG instance aligned with DL PRS resources of positioning frequency layer *i* closest in time after both the *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message from LMF via LPP [34] are delivered to the physical layer of UE.

Note: No per-positioning frequency layer requirement is applied in scenarios when multiple positioning frequency layers are configured.

*Editor’s note: FFS: PRS-RSRP measurement period when PRS-RSRP measurement is configured together with RSTD.*

*Editor’s note: FFS: PRS-RSRP measurement period when PRS-RSRP measurement is configured together with UE Rx-Tx.*

The requirements in this section apply, provided no PRS symbols are dropped during the measurement period TPRS-RSRP,Total within measurement gaps due to collisions with other signals; otherwise, a longer measurement period may be used.

If handover occurs while PRS-RSRP measurements are being performed then the UE shall complete the ongoing PRS-RSRP measurements session. The UE shall also meet the PRS-RSRP measurement requirements in this clause and measurement accuracy requirements in clause 10.1.24. However, in this case the PRS-RSRP measurement period shall be as follows:

where

 is the number of times handover occurs during ;

 is the largest among all positioning frequency layers;

is the time during which the PRS-RSRP measurement may not be possible due to handover; it can be up to Tinterrupt as defined in clause 6.1.

When the PRS-RSRP measurement is configured together with UE Rx-Tx time difference measurement, the UE behaviour at a serving cell (SpCell or SCell) change for the PRS-RSRP measurement is the same as the UE behaviour for the UE Rx-Tx time difference measurement specified in clause 9.9.4.5, and the PRS-RSRP measurement shall meet the accuracy requirements in clause 10.1.24.

When the PRS-RSRP measurement is configured together with RSTD measurement, the UE behaviour at a serving cell (SpCell or SCell) change for the PRS-RSRP measurement is the same as the UE behaviour for the RSTD measurement specified in clause 9.9.2.5, and the PRS-RSRP measurement shall meet the accuracy requirements in clause 10.1.24.

---------End changes---------