**3GPP TSG-RAN WG4 Meeting #101bis-e *R4-2207001***

**Electronic Meeting, 21 Feb – 3 Mar 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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| *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:*** | DraftCR – RSTD measurement requirements in RRC\_INACTIVE state | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | RAN WG4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh-Core | | | | |  | ***Date:*** | | | 2022-02-14 |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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 can be 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | Introduce a new section to specify RSTD measurement requirements when the UE is in RRC\_INACTIVE state | | | | | | | | |
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| ***Summary of change:*** | | Measurement period and applicability requirements for RSTD measurements performed in RRC\_INACTIVE state are introduced. | | | | | | | | |
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| ***Consequences if not approved:*** | | UE requirements for RSTD measurements performed in RRC\_INACTIVE state would be unspecified. | | | | | | | | |
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| ***Clauses affected:*** | | 5.5.2 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

### **< Start of change 1>**

5.5.2 RSTD measurements

#### 5.5.2.1 Introduction

The requirements in clause 5.5.2 shall apply provided the UE has received *NR-DL-TDOA-RequestLocationInformation* message from the LMF via LPP [34] requesting the UE to measure and report DL RSTD measurements defined in TS 38.215 [4].

#### 5.5.2.2 Requirements Applicability

The requirements in clause 5.5.2 apply for periodic and triggered RSTD measurements, provided:

- PRS-RSTD related side conditions given in clause 10.1.23 for FR1 and FR2 are fulfilled, for a corresponding Band.

#### 5.5.2.3 Measurement Capability

UE PRS RSTD measurement capability in RRC\_INACTIVE state is as indicated by the UE in *NR-DL-TDOA-ProvideCapabilities*, according to TS 37.355[34].

#### 5.5.2.4 Measurement Reporting Requirements

The measurement reporting delay is defined as the time between the moment when the periodic measurement report is triggered and the moment when the UE is ready to transmit the measurement report over the air interface. If the UE supports reporting of NR positioning measurements via SDT, the UE may be able to report the measurements while it remains in RRC\_INACTIVE state; otherwise, the UE will transition to RRC\_CONNECTED state prior to transmitting the measurement report.

For RSTD measurements performed by the UE in RRC\_INACTIVE state, The measurement reporting delay excludes all of the following:

* additional delay caused other LPP signalling on the DCCH,
* delay uncertainty introduced when inserting the measurement report in the TTI of the uplink DCCH, equal to 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,
* any delay caused by unavailability of UL resources to transmit the measurement report,
* any transmission delay needed by SDT,
* the time needed to transition to RRC\_CONNECTED state to report the measurements.

The reported RSTD measurement values contained in measurement reports shall be based on the measurement report mapping requirements specified in clauses 10.1.23.3.

The RSTD measurements performed and reported according to this section shall meet the RSTD measurement accuracy requirements in clause [ 10.1.23 ], for each measured DL PRS resource.

#### 5.5.2.5 Measurements Period Requirements

After receiving both *NR-TDOA-ProvideAssistanceData* message and *NR-TDOA-RequestLocationInformation* message from the LMF via LPP [34]*,* the UE shall be able to measure multiple (up to the UE capability specified in Clause 5.5.2.3) DL RSTD measurements, defined in TS 38.215 [4], during the measurement period defined as:

Where ,

is the index of positioning frequency layer,

is total number of positioning frequency layers, and

is the periodicity of the PRS RSTD measurement in positioning frequency layer i

is the measurement period for PRS RSTD measurement in positioning frequency layer *i* as specified below:

],

where:

is the UE Rx beam sweeping factor. = 1 in FR1. [For a UE that supports [reduced Rx beam sweeping capability], the LMF may request a reduced value of supported by the UE, otherwise = 8 in FR2.]

[ is a scaling factor for PRS-based NR positioning measurements in RRC\_INACTIVE. If the UE supports [Parallel PRS measurements in RRC\_INACTIVE state], Kcarrier\_PRS = 1; otherwise,

* If Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, , where is defined in clause 4.2.2.4
* If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, , where is defined in clause 4.2.2.7. ]

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

is the time duration of available PRS in positioning frequency layer *i* to be measured during , and is calculated in the same way as PRS duration K defined in clause 5.1.6.5 of TS 38.214 [26]. [ For calculation of , only unmuted PRS resources that are not fully overlapped with other higher-priority DL signals/channels are considered. ]

is the number of PRS RSTD samples, where

* = 1 if the UE supports [M-sample measurements], and the LMF requests the UE to perform positioning measurements with reduced number of samples, and one additional sample is not needed by the UE for Rx AGC,
* = 2 if the UE supports [M-sample measurements], and the LMF requests the UE to perform positioning measurements with reduced number of samples, and one additional sample is needed by the UE for Rx AGC,
* = 4 otherwise.

is the measurement duration for the last PRS RSTD sample in positioning frequency layer *i*, including the sampling time and processing time, = + ,

is the periodicity of the PRS RSTD measurement in positioning frequency layer i defined as:

*=*

Where,

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

*,* the least common multiple between and the DRX cycle length

is the periodicity of DL PRS resource with muting on positioning frequency layer *i*.

If more than one PRS periodicities are configured in positioning frequency layer *i*, the least common multiple of PRS periodicities among all DL PRS resource sets in the positioning frequency layer is used to derive , where,

, is the PRS periodicity with muting per PRS resource,

is the periodicity of PRS resource sets given by the higher-layer parameter *DL-PRS-Periodicity*.

is the scaling factor considering PRS resource muting. , where

is the muting repetition factor given by the higher-layer parameter *DL-PRS-MutingBitRepetitionFactor*, and is the size of the bitmap .

is the UE capability combination per band for RRC\_INACTIVE state where N is a duration of DL PRS symbols in ms corresponding to [*durationOfPRS-ProcessingSysmbols*] in TS 37.355 [34], T (ms) corresponds to [*durationOfPRS-ProcessingSymbolsInEveryTms*] in TS 37.355 [34], [ and T-N (>0) is the time required to process duration N of DL PRS symbols already buffered in memory], 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 [in RRC\_INACTIVE state as indicated by [*maxNumOfDL-PRS-ResProcessedPerSlot*] specified in TS 37.355 [34].

The time *s*tarts from [the first DRX cycle containing] a DL PRS resource(s) in the assistance data after both the *NR-TDOA-ProvideAssistanceData* message and *NR-TDOA-RequestLocationInformation* message are delivered from LMF to the UE via LPP [34].

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

If the DRX cycle is reconfigured during the RSTD measurement period, then the measurement period can be longer.

When PRS-RSRP is configured for DL-TDOA, RSTD and PRS-RSRP are performed over the same measurement period.

[ When PRS-RSRPP is configured for DL-TDOA, RSTD and PRS-RSRPP are performed over the same measurement period. ]

The measurement requirements do not apply to any PRS resource that always collides with other higher-priority DL signals/channels, as specified in clause 5.5.1.

Longer PRS measurement period is expected when there are collisions between PRS resources and other higher-priority DL signals/channels.

[If changes for any PFL during the measurement period, the measurement period could be longer.]

The measurement requirements do not apply for a PRS resource, if the PRS resource is across two sampling duration of N within duration .

The measurement requirements do not apply for a PRS resource, if time span of the PRS resource instance (including at least the minimum number of repetitions specified in the accuracy requirements) is greater than UE reported capability N.

The requirements in clause 5.5.2 do not apply if the PRS configuration given by higher layer paramters *NR-DL-PRS-AssistanceData* exceeds any of the UE measurement capabilities given by *NR-DL-PRS-ResourcesCapability* in *NR-DL-TDOA-ProvideCapabilities*, and it is up to UE implementation which PRS resources are measured, subject to UE measurement capabilities*.*

If cell re-selection occurs while RSTD measurements are being performed, then the UE shall continue and complete the on-going RSTD measurements after a new cell is selected. The RSTD measurement period can be longer.

The UE shall meet the RSTD measurement accuracy requirements in clause [ 10.1.23 ].

### **< End of change 1>**