**3GPP TSG-RAN WG4 Meeting #99-eR4-2108296**

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

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| *CR-Form-v12.0* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | | | | | | | | | | | | | | | | | | | |
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|  | **38.133** | **CR** | | **1976** | | | | | **rev** | | | **-** | | | **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 |  | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Title:*** | | | CR to TS 38.133 on UE Rx-Tx time difference measurements | | | | | | | | | | | | | | | | | | | | | | |
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| ***Source to WG:*** | | | OPPO | | | | | | | | | | | | | | | | | | | | | | |
| ***Source to TSG:*** | | | RAN4 | | | | | | | | | | | | | | | | | | | | | | |
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| ***Work item code:*** | | | NR\_pos-Core | | | | | | | | | | | | |  | ***Date:*** | | | 2021-05-24 | | | | | |
|  | | |  | | | | | | |  | | | | | | |  | | |  | | | | | |
| ***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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | | | | | | |
|  | | |  | | | | | | | | | | | | | | | | | | | | | | |
| ***Reason for change:*** | | | | | To complete remaining UE Rx-Tx time difference measurement period. | | | | | | | | | | | | | | | | | | | | |
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| ***Summary of change:*** | | | | | 1. Remove the differentiation of overlapping and non-overlapping case. 2. Update the definition of Tlast. 3. Add the clarification ‘No per-PFL requirements are applied in scenarios with multiple PFLs’. 4. Add the requirement applicabilities in case of cell changing and UL timing chaging. 5. Replace the term “PRS frequency layer” by “positioning frequency layer” 6. PRS resource muting option 1 is considered 7. Parameter LPRS,i is replaced as Lavailable\_PRS,i 8. Add clarification that PRS-RSRP and UE Rx-Tx measurements are performed over the same period if PRS-RSRP is configured for multi-RTT. | | | | | | | | | | | | | | | | | | | | |
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| ***Consequences if not approved:*** | | | | | Core requirements for UE Rx-Tx time difference are incomplete. | | | | | | | | | | | | | | | | | | | | |
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| ***Clauses affected:*** | | | | | 9.9.4.5 | | | | | | | | | | | | | | | | | | | | |
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|  | | | | | **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 ... | | | | | | | |
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| ***Other comments:*** | | | | |  | | | | | | | | | | | | | | | | | | | | |
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| ***This CR's revision history:*** | | | | |  | | | | | | | | | | | | | | | | | | | | |

**< Start of change >**

9.9.4.5 Measurement Period Requirements

When physical layer receives last of *NR-Multi-RTT-ProvideAssistanceData* message and *NR-Multi-RTT-RequestLocationInformation* message from LMF via LPP [34]*,* UE shall be able to measure multiple (up to the UE capability specified in clause 9.9.4.3) UE Rx-Tx time difference measurements as defined in TS 38.215 [4] in configured positioning frequency layers within the measurement period ms.

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where is the index of positioning frequency layer,

is the measurement period for UE Rx-Tx time difference measurements in positioning frequency layer *i* as further defined in this clause,

L is total number of positioning frequency layers, and

is the periodicity of the UE Rx-Tx time difference measurement in positioning frequency layer *i* as defined further in this clause.

Where

is the carrier-specific scaling factor for NR PRS-based measurement in the positioning frequency layer *i* as defined 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 can 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]. FFS: the observation for .

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 clause 4.2.7.2 of TS 37.355 [34],

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

is the number of UE Rx-Tx time difference measurement samples and = [4],

is the measurement duration for the last UE Rx-Tx time difference measurement sample, including the sampling time and processing time,  *= +*  ,

is periodicity of UE Rx-Tx time difference measurement in positioning frequency layer *i*:

where

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

, the least common multiple between and

is the measurement gap repetition periodicity in positioning frequency layer *i*.

is the PRS resource periodicity in positioning frequency layer *i*. If the positioning frequency layer *i* has more than one DL PRS resource sets with different PRS periodicities with muting, , the least common multiple of among DL PRS resource sets is used to derive the measurement period of that positioning frequency layer.

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

is the scaling factor considering PRS resource muting. If bitmap for higher-layer parameter *DL-PRS-MutingPattern* is provided, and , then ; otherwise, if bitmap is not provided or , then . is the muting repetition factor given by the higher-layer parameter *DL-PRS-MutingBitRepetitionFactor*, and L is the size of the bitmap .

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

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-Multi-RTT-RequestLocationInformation* message and *NR-Multi-RTT-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.

The UE Rx-Tx time difference measurement period is restarted if HO occurs during the measurement period and after SRS reconfiguration on the target cell is complete.

The measurement requirements do not apply for a PRS resource:

* if the PRS resource is across two sampling duration of N within duration or
* 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.

When PRS-RSRP is configured for multi-RTT, the UE Rx-Tx time difference measurements and PRS-RSRP measurements are performed over the same measurement period.

*Editor’s note: FFS: Measurement period requirements when cell change does not impact SRS configuration*

*Editor’s note: FFS: Measurement period requirements when cell change does impact SRS configuration*

*Editor’s note: FFS: The UE Rx-Tx time difference measurement period requirements in this clause shall not apply, if the uplink transmission timing changes during the UE Rx-Tx measurement period due to the network-configured Timing Advance.*

*Editor’s note: FFS: The UE Rx-Tx time difference measurement period requirements in this clause shall not apply, if NTA\_offset defined in Table 7.1.2-2 changes during the UE Rx-Tx measurement period.*

9.9.5 NR E-CID measurements

*.***< End of change >**