**3GPP TSG-RAN4 Meeting #102-e *R4-2207127***

**Electronic Meeting, 21st February – 3rd March, 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **-** | **rev** | **-** | **Current version:** | **17.4.0** |  |
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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:***  | Big CR: RRM requirements for Rel-17 Enhanced IIoT and URLLC support |
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|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_IIOT\_URLLC\_enh |  | ***Date:*** | 2022-03-06 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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 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:*** | * UE Rx-Tx measurement based on TRS or PRS within te serving cell is introduced for propagation delay compensation.
* To clarify the defintion of the reference point for UE initial timing requirements.
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| ***Summary of change:*** | * Define measurement requirements for UE Rx-Tx measurement for propagation delay compensation.
* The definition of the reference point for the UE initial transmit timing control requirement is clarified.
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| ***Consequences if not approved:*** | * Performance for UE Rx-Tx measurement for propagation delay compensation cannot be guaranteed~~.~~
* Misinterpretation of the UE initial transmit timing error requirements.
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| ***Clauses affected:*** | 9.12 (new); 7.1.2 |
|  |  |
|  | **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:*** |  |

<Start of Change 1>

## 9.12 Measurement for Propagation Delay Compensation

### 9.12.1 Introduction

The requirements in this clause are applicable for UE capable of RTT based propagation delay compensation based on TRS and SRS, PRS and SRS, indicated by [TBD].

### 9.12.2 Requirements Applicability

The requirements in clause 9.12 apply for [periodic/semi-persistent/aperiodic] and triggered UE Rx-Tx time difference measurements, provided:

- If UE Rx-Tx time difference measurement is based on PRS, the related side conditions given in clause [TBD] are met for a corresponding band.

- If UE Rx-Tx time difference measurement is based on TRS, the related side conditions given in clause [TBD] are met for a corresponding band.

- SRS is configured on at least one of the PCell.

### 9.12.3 Measurement Capability

If UE Rx-Tx time difference measurement is based on PRS, the capability is as indicated by the UE in [TBD].

If UE Rx-Tx time difference measurement is based on TRS, the capability is as indicated by the UE in [TBD].

### 9.12.4 Measurement period requirements

#### 9.12.4.1 PRS Measurement Period

The UE shall be able to measure UE Rx-Tx time difference on PCell after receiving [TBD, command from network that triggers the UE Rx-Tx measurement] within TUERx-Tx\_PRS, where

where

 is the time duration of available PRS resources to be measured during , and is calculated in the same way as PRS duration K defined in [TBD].

 is the maximum number of DL PRS resources 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 [TBD] processed every T ms corresponding to [*durationOfPRS-ProcessingSymbolsInEveryTms*] in [TBD] for a given maximum bandwidth supported by UE corresponding to [*supportedBandwidthPRS* ] in [TBD],

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

 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, including the sampling time and processing time, = + ,

 is periodicity of UE Rx-Tx time difference measurement:

where

 corresponds to [*durationOfPRS-ProcessingSymbolsInEveryTms*] defined in [TBD],

 is the PRS resource periodicity specific for PDC RTT UE Rx-Tx time difference measurement.

Note: the PRS measurement period can be revisited based on further agreement from RAN1/2 and further RAN4 discussion.

UE is only required to perform UE Rx-Tx time difference on PRS within the active DL BWP.

When UE is configured to perform UE Rx-Tx time difference measurement based on PRS, the requirements apply provided that the SCS of the PRS is same as that of the active BWP on PCell.

#### 9.12.4.2 TRS Measurement Period

The UE shall be able to measure UE Rx-Tx time difference on PCell after receving [TBD, command from network that triggers the UE Rx-Tx measurement] within TUERx-Tx\_TRS, where

Where

 is the number of UE Rx-Tx time difference measurement samples and is [1 or 4],

 is the TRS resource periodicity specific for PDC RTT UE Rx-Tx time difference measurement.

Note: the TRS measurement period TUERx-Tx\_TRS can be revisited based on further agreement from RAN1/2 and further RAN4 discussion.

UE is only required to perform UE Rx-Tx time difference on TRS within the active DL BWP.

When UE is configured to perform UE Rx-Tx time difference measurement based on TRS, the requirements apply provided that the SCS of the TRS is same as that of the active BWP on PCell.

<End of Change 1>

<Start of Change 2>

### 7.1.2 Requirements

The UE initial transmission timing error shall be less than or equal to ±Te where the timing error limit value Te is specified in Table 7.1.2-1. This requirement applies:

- when it is the first transmission in a DRX cycle for PUCCH, PUSCH and SRS, or it is the PRACH transmission, or it is the msgA transmission..

The UE shall meet the Te requirement for an initial transmission provided that at least one SSB is available at the UE during the last 160 ms. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the reference cell minus . The downlink timing is defined as the time when the first path (in time) of the corresponding downlink frame used by the UE to determine downlink timing is received from the reference cell at the UE antenna. *N*TA for PRACH is defined as 0.

 (in *Tc* units) for other channels is the difference between UE transmission timing and the downlink timing immediately after when the last timing advance in clause 7.3 was applied. *N*TA for other channels is not changed until next timing advance is received. The value ofdepends on the duplex mode of the cell in which the uplink transmission takes place and the frequency range (FR). is defined in Table 7.1.2-2.

Table 7.1.2-1: Te Timing Error Limit

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of SSB signals (kHz) | SCS of uplink signals (kHz) | Te |
| 1 | 15 | 15 | 12\*64\*Tc |
|  |  | 30 | 10\*64\*Tc |
|  |  | 60 | 10\*64\*Tc |
|  | 30 | 15 | 8\*64\*Tc |
|  |  | 30 | 8\*64\*Tc |
|  |  | 60 | 7\*64\*Tc |
| 2 | 120 | 60 | 3.5\*64\*Tc |
|  |  | 120 | 3.5\*64\*Tc |
|  | 240 | 60 | 3\*64\*Tc |
|  |  | 120 | 3\*64\*Tc |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [6] |

Table 7.1.2-2: The Value of 

|  |  |
| --- | --- |
| Frequency range and band of cell used for uplink transmission | (Unit: TC) |
| FR1 FDD or TDD band with neither E-UTRA–NR nor NB-IoT–NR coexistence case  | 25600 (Note 1) |
| FR1 FDD band with E-UTRA–NR and/or NB-IoT–NR coexistence case  | 0 (Note 1) |
| FR1 TDD band with E-UTRA–NR and/or NB-IoT–NR coexistence case | 39936 (Note 1) |
| FR2 | 13792 |
| Note 1: The UE identifies  based on the information n-TimingAdvanceOffset as specified in TS 38.331 [2]. If UE is not provided with the information n-TimingAdvanceOffset, the default value of  is set as 25600 for FR1 band. In case of multiple UL carriers in the same TAG, UE expects that the same value of n-TimingAdvanceOffset is provided for all the UL carriers according to clause 4.2 in TS 38.213 [3] and the value 39936 of  can also be provided for a FDD serving cell.Note 2: Void |

When it is not the first transmission in a DRX cycle or there is no DRX cycle, and when it is the transmission for PUCCH, PUSCH and SRS transmission, the UE shall be capable of changing the transmission timing according to the received downlink frame of the reference cell except when the timing advance in clause 7.3 is applied.

Table 7.1.2-3: void

If the UE uses a reference cell on a carrier frequency subject to CCA for deriving the UE transmit timing, then the UE shall meet all the transmit timing requirements defined in clause 7.1.2 provided that the reference cell is available at the UE. If the reference cell is not available at the UE on a carrier frequency subject to CCA, then the UE is allowed to transmit in the uplink provided that the UE meets all the transmit timing requirements defined in clause 7.1.2; otherwise the UE shall not transmit any uplink signal.

If a reference cell on a carrier frequency belonging to the PTAG, which is subject to CCA, is not available at the UE then the UE is allowed to use any of available activated SCell(s) at the UE in PTAG as a new reference cell. If the SCell used as reference cell is deactivated, or becomes not available, the UE is allowed to use another active serving cell in PTAG as new reference cell.

If a reference cell on a carrier frequency belonging to the STAG, which is subject to CCA is not available at the UE then the UE is allowed to use any of available activated SCell(s) at the UE in STAG as a new reference cell.

<End of Change 2>