**3GPP TSG-WG4 Meeting #112 *R4-241XXXX***

**Maastricht, Netherlands, August, 19 - 23, 2024**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **Draft** | **rev** | **1** | **Current version:** | **18.6.0** |  |
|  | | | | | | | | |
| *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:*** | Sets (7-7) and (7-8) Measurement delay TCs for RSCP with UE Rx-Tx in RRC\_INACTIVE for FR1 and FR2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh2-Perf | | | | |  | ***Date:*** | | | 2024-08-09 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | TCs for DL RSCP for RRC\_INACTIVE are missing in TS 38.133. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. In Annex A.6.8.6.1, the test case for DL RSRP and UE Rx-Tx time difference measurements in RRC\_INACTIVE for FR1 is introduced. 2. In Annex A.7.8.6.1, the test case for DL RSRP and UE Rx-Tx time difference measurements in RRC\_INACTIVE for FR2 is introduced. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Missing test cases for DL CPP. DL CPP enhancement is not testable in RRC\_INACTIVE. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.6.8.6.1, A.7.8.6.1 (all new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | None. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4- 2413312 | | | | | | | | |

**--- Start of change 1 ---**

### A.6.8.6.1 DL RSCP with UE Rx-Tx time difference measurements in RRC\_INACTIVE in FR1 SA

#### A.6.8.6.1.1 DL RSCP with UE Rx-Tx time difference measurement for single positioning frequency layer in FR1 SA

##### A.6.8.6.1.1.1 Test purpose and environment

The purpose of the test is to verify that the DL RSCP and UE Rx-Tx time difference measurements in RRC\_INACTIVE state meet the requirements specified in clause 5.6.8.5 in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured for both DL RSCP measurement and UE Rx-Tx time difference measurement.

The supported test configurations are listed in Table A.6.8.6.1.1.1-1.

Table A.6.8.6.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 50 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* message and *NR-Multi-RTT-RequestLocationInformation* message as defined in TS 37.355 [34], shall be provided to the UE during T1. In *NR-Multi-RTT-RequestLocationInformation,* the UE is configured to perform DL RSCP measurement via *nr-DL-PRS-RSCP-Request*. The UE is configured to perform both DL RSCP and UE Rx-Tx time difference measurements within the time window indicated to UE via *nr-DL-PRS-MeasurementTimeWindowsConfig* but the time window periodicity is not configured. The last slot containing the two messages for the multi-RTTI assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 shall be aligned with the start of the configured time window containing the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are listed in Table A.6.8.6.1.1.1-2 and Table A.6.8.6.1.1.1-3.

Table A.6.8.6.1.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1, 2, 3 | Cell 1 | Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1, 2, 3 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 20: NRB,c = 106 |  |
| 2 | 20: NRB,c = 106 |  |
| 3 | 50: NRB,c = 133 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| DRX cycle |  | 1, 2, 3 | 1.28s |  |
| Time offset between serving and neighbour cells | μs | 1, 2, 3 | 3 | Synchronous cells |
| Time window configuration |  | 1, 2, 3 | MTW.2 | As specified in clause A.3.Y |
| T1 | s | 1, 2, 3 | 5 |  |
| T2 | s | 1, 2, 3 | 10 |  |

Table A.6.8.6.1.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
|  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  |  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  |  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.2 FR1 | | PRS.1.2 FR1 | |
|  | 2 | PRS.1.2 FR1 | | PRS.1.2 FR1 | |
|  | 3 | PRS.2.2 FR1 | | PRS.2.2 FR1 | |
| PRS muting info |  | 1, 2, 3 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.1 | | N/A | |
|  | 2 | POS-SRS.1 | | N/A | |
|  | 3 | POS-SRS.2 | | N/A | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -100 | -Infinity | -108 |
|  | 2 | -Infinity | -100 | -Infinity | -108 |
|  | 3 | -Infinity | -97 | -Infinity | -105 |
| Io | dBm/19.08 MHz | 1 | N/A | -64.57 | N/A | -64.57 |
| dBm/19.08 MHz | 2 | -64.57 | -64.57 |
| dBm/47.88 MHz | 3 | -60.59 | -60.59 |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | | |

##### A.6.8.6.1.1.2 Test requirements

The DL RSCP with UE Rx-Tx time difference measurement time in RRC\_INACTIVE state fulfils the requirements specified in clause 5.6.8.

The UE shall perform and report the DL RSCP and UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified DL RSCP with UE Rx-Tx time difference measurement time specified in clause 5.6.8 starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be higher than the time duration above because of the uncertainty in acquiring the first available PRACH occasion to transition to RRC\_CONNECTED state to report the measurements.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported DL RSCP measurement for each correct event shall be within the DL RSCP reporting range specified in clause 10.1.Z1 and the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.

**--- End of change 1 ---**

**--- Start of change 2 ---**

A.7.8.6.1 DL RSCP with UE Rx-Tx time difference measurements in RRC\_INACTIVE in FR2 SA

A.7.8.6.1.1 DL RSCP with UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA

A.7.8.6.1.1.1 Test purpose and environment

The purpose of the test is to verify that the DL RSCP and UE Rx-Tx time difference measurements in RRC\_INACTIVE state meet the requirements specified in clause 5.6.8.5 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured for both DL RSCP measurement and UE Rx-Tx time difference measurement.

The supported test configurations are listed in Table A.7.8.6.1.1.1-1.

**Table A.7.8.6.1.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 200 MHz bandwidth, TDD duplex mode |

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Both cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* message and *NR-Multi-RTT-RequestLocationInformation* message as defined in TS 37.355 [34], shall be provided to the UE during T1. In *NR-Multi-RTT-RequestLocationInformation,* the UE is configured to perform DL RSCP measurement via *nr-DL-PRS-RSCP-Request*. The UE is configured to perform both DL RSCP and UE Rx-Tx time difference measurements within the time window indicated to UE via *nr-DL-PRS-MeasurementTimeWindowsConfig* but the time window periodicity is not configured. The last slot containing the two messages for the multi-RTTI assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 shall be aligned with the start of the configured time window containing the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are listed in Table A.7.8.6.1.1.1-2 and Table A.7.8.6.1.1.1-3.

**Table A.7.8.6.1.1.1-2: General test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 200: NRB,c = 132 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| CP length |  | 1 | Normal |  |
| DRX cycle |  | 1 | 0.64s |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| Time window configuration |  | 1 | MTW.2 | As specified in clause A.3.Y |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |

**Table A.7.8.6.1.1.1-3: Cell specific test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/190.08 MHz | 1 | N/A | -54.62 | N/A | -54.62 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4.  Note 9: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | | |

A.7.8.6.1.1.2 Test requirements

The DL RSCP with UE Rx-Tx time difference measurement time in RRC\_INACTIVE state fulfils the requirements specified in clause 5.6.8.

The UE shall perform and report the DL RSCP and UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified DL RSCP with UE Rx-Tx time difference measurement time specified in clause 5.6.8 starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be higher than the time duration above because of the uncertainty in acquiring the first available PRACH occasion to transition to RRC\_CONNECTED state to report the measurements.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported DL RSCP measurement for each correct event shall be within the DL RSCP reporting range specified in clause 10.1.Z1 and the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.

**--- End of change 2 ---**