**3GPP TSG- Meeting # R4-2410178**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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:*** | (8-5, 8-6) Draft CR Accuracy test cases for RSCP reporting with UE Rx-Tx measurement in RRC\_CONNECTED mode | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Xiaomi | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh2-Perf | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *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:*** | | Add test cases to verify measurement delay requirements for PRS measurements with BW aggregation. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add the following test cases for CPP (Cairrer phase posioining):   1. 8-5 RSCP with UE Rx-Tx in RRC\_CONNECTED in FR1: measurement accuracy TC (A.6.7.X) 2. 8-6 RSCP with UE Rx-Tx in RRC\_CONNECTED in FR2: measurement accuracy TC (A.7.7.X) | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Test cases to verify measurement delay requirements for CPP would be missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.6.7.X, A.7.7.X | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**----------------------START OF CHANGE #1: 8-5----------------------------**

### A.6.7.x RSCP with UE Rx-Tx time difference measurements

#### A.6.7.x.1 RSCP with UE Rx-Tx time difference measurement accuracy in FR1 SA

##### A.6.7.x.2.1 Test purpose and environment

The purpose of the test is to verify that RSCP with UE Rx-Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.Z1.2. The test is conducted in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.6.7.x.2.1-1.

Table A.6.7.x.2.1-1: 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). All cells are on the same RF channel in FR1.

The *NR-Multi-RTT-ProvideAssistanceData* , *NR-Multi-RTT-RequestLocationInformation* with *nr-DL-PRS-RSCP-Request* from LMF via LPP [34] and *NR-Multi-RTT-MeasurementCapability* as defined in TS 37.355 [34, clause 6.5.12.] to enable UE to perform and report RSCP in RRC CONNECTED, shall be provided to the UE before the start of the test.

The UE is configured with measurement gap pattern ID #0 or ID #24 before the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.6.7.x.2.2 Test parameters

The RSCP with UE Rx-Tx time difference accuracy test parameters are given in Table A.6.7.x.2.2-1.

Table A.6.7.x.2.2-1: RSCP with UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Test 1** | |
|  |  | Cell 1 | Cell 2 |
| RF Channel Number |  | 1,2,3 | 1 | 1 |
| Measurement gap |  | 1,2,3 | GP#24 or GP#0 Note 4 | |
| DRX |  | 1,2,3 | OFF | |
| Time offset with Cell 1 | μs | 1, 2, 3 | N/A | 3 |
| 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.1.1 FR1 | PRS.1.1 FR1 |
|  |  | 2 | PRS.1.1 FR1 | PRS.1.1 FR1 |
|  |  | 3 | PRS.2.1 FR1 | PRS.2.1 FR1 |
| PRS BW |  | 1 | 52 PRBs | 52 PRBs |
|  | 2 | 52 PRBs | 52 PRBs |
|  | 3 | 48 PRBs | 48 PRBs |
| PRS Resource slot offset | slot | 1, 2, 3 | 0 | 4 |
| 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 | 0 | -6 |
|  | 2 |  |  |
|  |  | 3 |  |  |
| PRS | dB | 1 | 2.23 | -1.73 |
|  | 2 |  |  |
|  |  | 3 |  |  |
| PRP Note 3 | dBm/SCS kHz | 1 | -95.77 | -99.73 |
|  | 2 | -95.77 | -99.73 |
|  | 3 | -92.77 | -96.73 |
| Io | dBm/19.08 MHz | 1 | -61.71 | -61.71 |
| dBm/19.08 MHz | 2 | -61.71 | -61.71 |
| dBm/47.88 MHz | 3 | -57.73 | -57.73 |
| 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: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

##### A.6.7.x.2.3 Test requirements

The RSCP with UE Rx-Tx time difference measurement fulfils RSCP with UE Rx-Tx measurement accuracy specified in clause 10.1.Z1.2 for both Cell 1 and Cell 2.

**----------------------End OF CHANGE #1----------------------------**

**----------------------START OF CHANGE #2: 8-6----------------------------**

### A.7.7.x RSCP with UE Rx-Tx time difference measurements

#### A.7.7.x.2 RSCP with UE Rx-Tx time difference measurement accuracy in FR2 SA

##### A.7.7.x.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.Z1.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configuration is listed in Table A.7.7.x.2.1-1.

**Table A.7.7.12.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **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). All cells are on the same RF channel in FR2.

The *NR-Multi-RTT-ProvideAssistanceData* , *NR-Multi-RTT-RequestLocationInformation* with *nr-DL-PRS-RSCP-Request* from LMF via LPP [34] and *NR-Multi-RTT-MeasurementCapability* as defined in TS 37.355 [34, clause 6.5.12.] to enable UE to perform and report RSCP in RRC CONNECTED, shall be provided to the UE before the start of the test.

The UE is configured with measurement gap pattern ID #13 or ID #24 before the test.

The UE is configured to transmit positioning SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

##### A.7.7.x.2.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.7.7.x.2.2-1.

Table A.7.7.x.2.2-1: RSCP with UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | |
|  | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 |  | 1 | Rough | Rough |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 8 | |
| DRX |  | 1 | OFF | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 |
| 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 BW |  | 1 | 64 PRBs | 64 PRBs |
| PRS Resource slot offset | slot | 1 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A |
| Note 2 | dBm/SCS | 1 | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | |
| PRS | dB | 1 | 0 | -6 |
| PRS | dB | 1 | 2.23 | -1.73 |
| PRP Note 3 | dBm/SCS kHz | 1 | -86.77 | -90.73 |
| Io | dBm/190.08 MHz | 1 | -51.76 | -51.76 |
| Propagation Condition |  | 1 | AWGN | |
| Note 1: Void.  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: PRP 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: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured.  Note 9: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [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. | | | | |

##### A.7.7.x.2.3 Test requirements

The RSCP with UE Rx-Tx time difference measurements fulfils the RSCP measurement accuracy requirements specified in clause 10.1.Z1.2 for both Cell 1 and Cell 2.

**----------------------END OF CHANGE #2: 8-6----------------------------**