**3GPP TSG-RAN WG4 Meeting #112 R4-24xxxx**

**Maastricht, Netherlands, 19th – 23rd August, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **draftCR** | **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:*** | (8-1,8-2,8-3,8-4, 8-7,8-8) Draft CR RSCPD test case | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Xiaomi | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh2-Perf | | | | |  | ***Date:*** | | | 8/8/2024 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | 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. 8-1 RSCPD with RSTD in RRC\_CONNECTED in FR1: measurement accuracy TC (A.6.7.X) 2. 8-2 RSCPD with RSTD in RRC\_CONNECTED in FR2: measurement accuracy TC (A.7.7.X) 3. 8-3 RSCPD with RSTD in RRC\_INACTIVE in FR1: measurement accuracy TC (A.6.9.X) 4. 8-4 RSCPD with RSTD in RRC\_INACTIVE in FR2: measurement accuracy TC (A.7.9.X) 5. 8-7 RSCP with UE Rx-Tx in RRC\_INACTIVE in FR1: measurement accuracy TC (A.6.9.X) 6. 8-8 RSCP with UE Rx-Tx in RRC\_INACTIVE in FR2: measurement accuracy TC (7.9.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, A.6.9.X, A.7.9.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: 8-1----------------------------**

### A.6.7.19.1 RSCPD with RSTD measurements

#### A.6.7.19.1.1 RSCPD with RSTD measurement accuracy in FR1 SA in RRC\_CONNECTED

##### A.6.7.19.1.1.1 Test purpose and environment

The purpose of the test is to verify that RSCPD with RSTD measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.Y1.2. 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.6.7.19.1.1.1-1.

Table A.6.7.19.1.1.1-1: 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). All cells are on the same RF channel in FR1.

The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* with *nr-DL-PRS-RSCPD-Request* from LMF via LPP [34] as defined in TS 37.355 [34, clause 6.5.12.] to enable UE to perform and report RSCPD 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.

##### A.6.7.19.1.1.2 Test parameters

The RSCP with UE Rx-Tx time difference accuracy test parameters are given in Table A.6.7.19.1.1.2-1.

Table A.6.7.19.1.1.1.2-1: RSCPD with UE RSTD measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| PRS ARFCN | 1~3 |  | freq1 | Freq1 |
| BWchannel | 1 | MHz | 20: NRB,c = 106 | |
| 2 | 20: NRB,c = 106 | |
| 3 | 50: NRB,c = 133 | |
| Duplex mode | 1 |  | FDD | |
| 2 | TDD | |
| 3 | TDD | |
| TDD configuration | 1 |  | N/A | |
| 2 | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | |
| Measurement gap | 1, 2, 3 |  | GP#24 or GP#0 | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - |
| 2 | SR.1.1 TDD |  |
| 3 | SR.2.1 FDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - |
| 2 | CR.1.1 TDD | - |
| 3 | CR.2.1 FDD | - |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - |
| 2 | CCR.1.1 TDD | - |
| 3 | CCR.2.1 TDD | - |
| SSB configuration | 1 |  | SSB.1 FR1 | |
| 2 | SSB.1 FR1 | |
| 3 | SSB.2 FR1 | |
| OCNG Patterns | 1~3 |  | OP.1 | |
| TRS configuration | 1 |  | TRS.1.1 FDD | - |
| 2 | TRS.1.1 TDD |  |
| 3 | TRS.1.2 TDD |  |
| Initial BWP Configuration | 1~3 |  | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1~3 |  | DLBWP.1.1  ULBWP.1.1 | |
| Time offset with Cell 1 | 1 | μs | - | 3 |
| 2,3 | - | 3 |
| SMTC configuration | 1 |  | SMTC.2 | |
| 2,3 | SMTC.1 | |
| PRS configuration | 1 |  | PRS.1.1 FR1 | |
| 2 | PRS.1.1 FR1 | |
| 3 | PRS.2.1 FR1 | |
| PRS Resource slot offset | 1, 2, 3 | slot | 0 | 4 |
| Expected RSTD | 1, 2, 3 | μs | N/A | 3 |
| Expected RSTD uncertainty | 1, 2, 3 | μs | N/A | 5 |
| EPRE ratio of PSS to SSS | 1~3 | dB | 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 | 1~3 | dB | 0 | 0 |
| Note2 | 1,2 | dBm/ SCS | -98 | |
| 3 | -95 | |
| PRS | 1~3 | dB | -6 | -13 |
| PRPNote3 | 1,2 | dBm/SCS | -103.7 | -109.9 |
| 3 | -100.7 | -106.9 |
| IoNote3 | 1,2 | dBm/  19.08MHz | -65.70 | -65.70 |
| 3 | dBm/  47.88MHz | -61.72 | -61.72 |
| PRS | 1~3 | dB | -65.70 | -65.70 |
| SSB | 1~3 | dB | -5.7 | |
| Propagation condition | 1~3 | - | AWGN | |
| Antenna configuration | 1~3 |  | 1x2 | |
| 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 other than those in the slots with transmitted PRS.  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. The Io is calculated based only on the symbols in which PRS is transmitted.  Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | |

##### A.6.7.19.1.1.3 Test requirements

The RSCPD reported together with RSTD fulfils RSCPD with RSTD measurement accuracy specified in clause 10.1.Y1.2 for both Cell 1 and Cell 2.

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

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

### A.7.7.16.1 RSCPD with RSTD measurements

#### A.7.7.16.1.1 RSCPD with RSTD measurement accuracy in FR2 SA in RRC\_CONNECTED

##### A.7.7.16.1.1.1 Test purpose and environment

The purpose of the test is to verify that RSCPD with RSTD measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.Y1.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.7.7. 16.1.1.1-1.

Table A.7.7. 16.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB 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-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* with *nr-DL-PRS-RSCPD-Request* from LMF via LPP [34] as defined in TS 37.355 [34, clause 6.5.12.] to enable UE to perform and report RSCPD 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 test duration should be larger than the UE measurement period as defined in clause 9.9.2.

##### A.7.7.16.11.2 Test parameters

The RSCPD with RSTD accuracy test parameters are given in Table A.7.7.16.11..2-1 and Table A.7.7.16.1.1.2-2.

|  |  |  |  |
| --- | --- | --- | --- |
| Table A.7.7.16.1.1.2-1: RSCPD accuracy test parametersParameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| PRS ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 200: NRB,c = 132 | |
| Measurement gap |  | GP#24 or GP#13 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS Resource slot offset | slot | 0 | 4 |
| Expected RSTD | μs | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 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 | dB | 0 | 0 |
| Propagation conditions |  | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 |
| 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 other than those in the slots with transmitted PRS. | | | |

Table A.7.7.16.1.1-2: RSCPD accuracy OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 5 |  | Rough | |
| Note1 | dBm/SCSNote3 | -89 | |
| PRS | dB | -5.7 | -11.9 |
| PRPNote2 | dBm/SCS | -94.7 | -100.9 |
| PRS | dB | -6 | -13 |
| IoNote2 | dBm/190.08 MHz Note3 | -55.75 | -55.75 |
| Note 1: Where used, 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 2: PRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The Io is calculated based only on the symbols in which PRS is transmitted.  Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | |

##### A.7.7.16.1.1.3 Test requirements

The RSCPD reported together with RSTD fulfils RSCPD with RSTD measurement accuracy specified in clause 10.1.Y1.2 for both Cell 1 and Cell 2.

**----------------------End OF CHANGE #2---------------------------**

**----------------------START OF CHANGE #3: 8-3----------------------------**

### A.6.9.5.1 RSCPD with RSTD measurements

#### A.6.9.5.1.1 RSCPD with RSTD measurement accuracy in FR1 SA in RRC\_INACTIVE

##### A.6.9.5.1.1.1 Test purpose and environment

The purpose of the test is to verify that RSCPD with RSTD measurement accuracy in RRC\_INACTIVE. This test will verify the requirements in clause 10.1.Y1.2. 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.6.9. 5.11.1-1.

Table A.6.9. 5.1.1.1-1: 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). All cells are on the same RF channel in FR1.

The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* with *nr-DL-PRS-RSCPD-Request* from LMF via LPP [34] as defined in TS 37.355 [34, clause 6.5.12.] to enable UE to perform and report RSCPD in RRC INACTIVE shall be provided to the UE before the start of the test. The UE is configured with DRX cycle of 1.28s

##### A.6.9.5.1.1.2 Test parameters

The RSCPD with RSTD accuracy test parameters are given in Table A.6.9. 5.1.1.2-1.

Table A.6.9. 5.1.1.2-1: RSCPD with UE RSTD measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| PRS ARFCN | 1~3 |  | freq1 | Freq1 |
| BWchannel | 1 | MHz | 20: NRB,c = 106 | |
| 2 | 20: NRB,c = 106 | |
| 3 | 50: NRB,c = 133 | |
| Duplex mode | 1 |  | FDD | |
| 2 | TDD | |
| 3 | TDD | |
| TDD configuration | 1 |  | N/A | |
| 2 | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - |
| 2 | SR.1.1 TDD |  |
| 3 | SR.2.1 FDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - |
| 2 | CR.1.1 TDD | - |
| 3 | CR.2.1 FDD | - |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - |
| 2 | CCR.1.1 TDD | - |
| 3 | CCR.2.1 TDD | - |
| SSB configuration | 1 |  | SSB.1 FR1 | |
| 2 | SSB.1 FR1 | |
| 3 | SSB.2 FR1 | |
| OCNG Patterns | 1~3 |  | OP.1 | |
| TRS configuration | 1 |  | TRS.1.1 FDD | - |
| 2 | TRS.1.1 TDD |  |
| 3 | TRS.1.2 TDD |  |
| Initial BWP Configuration | 1~3 |  | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1~3 |  | DLBWP.1.1  ULBWP.1.1 | |
| Time offset with Cell 1 | 1 | μs | - | 3 |
| 2,3 | - | 3 |
| SMTC configuration | 1 |  | SMTC.2 | |
| 2,3 | SMTC.1 | |
| PRS configuration | 1 |  | PRS.1.1 FR1 | |
| 2 | PRS.1.1 FR1 | |
| 3 | PRS.2.1 FR1 | |
| PRS Resource slot offset | 1, 2, 3 | slot | 0 | 4 |
| Expected RSTD | 1, 2, 3 | μs | N/A | 3 |
| Expected RSTD uncertainty | 1, 2, 3 | μs | N/A | 5 |
| EPRE ratio of PSS to SSS | 1~3 | dB | 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 | 1~3 | dB | 0 | 0 |
| Note2 | 1,2 | dBm/ SCS | -98 | |
| 3 | -95 | |
| PRS | 1~3 | dB | -6 | -13 |
| PRPNote3 | 1,2 | dBm/SCS | -103.7 | -109.9 |
| 3 | -100.7 | -106.9 |
| IoNote3 | 1,2 | dBm/  19.08MHz | -65.70 | -65.70 |
| 3 | dBm/  47.88MHz | -61.72 | -61.72 |
| PRS | 1~3 | dB | -65.70 | -65.70 |
| SSB | 1~3 | dB | -5.7 | |
| Propagation condition | 1~3 | - | AWGN | |
| Antenna configuration | 1~3 |  | 1x2 | |
| 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 other than those in the slots with transmitted PRS.  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. The Io is calculated based only on the symbols in which PRS is transmitted.  Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

##### A.6.9.5.1.1.3 Test requirements

The RSCPD reported together with RSTD fulfils RSCPD with RSTD measurement accuracy specified in clause 10.1.Y1.2 for both Cell 1 and Cell 2.

**----------------------END OF CHANGE #3: 8-3----------------------------**

**----------------------START OF CHANGE #4: 8-4----------------------------**

### A.7.9.5.1 RSCPD with RSTD measurements

#### A.7.9.5.1.1 RSCPD with RSTD measurement accuracy in FR2 SA in RRC\_INACTIVE

##### A.7.9.5.1.1.1 Test purpose and environment

The purpose of the test is to verify that RSCPD with RSTD measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.Y1.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.7.9. 5.1.1.1-1.

Table A.7.9. 5.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB 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-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* with *nr-DL-PRS-RSCPD-Request* from LMF via LPP [34] as defined in TS 37.355 [34, clause 6.5.12.] to enable UE to perform and report RSCPD in RRC INACTIVE, shall be provided to the UE before the start of the test.

##### A.7.9.5.1.1.2 Test parameters

The RSCPD with RSTD accuracy test parameters are given in Table A.7.9.5.1.1.2-1.

Table A.7.9. 5.1.1.2-1: RSCPD with UE RSTD measurement accuracy test parameters in RRC\_INACTIVE

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| PRS ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 200: NRB,c = 132 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS Resource slot offset | slot | 0 | 4 |
| Expected RSTD | μs | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 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 | dB | 0 | 0 |
| Propagation conditions |  | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 |
| 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 other than those in the slots with transmitted PRS. | | | |

Table A.7.7. 5.1.1.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 5 |  | Rough | |
| Note1 | dBm/SCSNote3 | -89 | |
| PRS | dB | -5.7 | -11.9 |
| PRPNote2 | dBm/SCS | -94.7 | -100.9 |
| PRS | dB | -6 | -13 |
| IoNote2 | dBm/190.08 MHz Note3 | -55.75 | -55.75 |
| Note 1: Where used, 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 2: PRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The Io is calculated based only on the symbols in which PRS is transmitted.  Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | |

##### A.7.9.5.1.1.3 Test requirements

The RSCPD reported together with RSTD fulfils RSCPD with RSTD measurement accuracy specified in clause 10.1.Y1.2 for both Cell 1 and Cell 2.

**----------------------END OF CHANGE #4: 8-4----------------------------**

**----------------------START OF CHANGE #5: 8-7----------------------------**

### A.6.9.6.1 RSCP with UE Rx-Tx time difference measurements in RRC\_INACTIVE

#### A.6.9.6.1.1 RSCP with UE Rx-Tx time difference measurement accuracy in FR1 SA

##### A.6.9.6.1.1.1 Test purpose and environment

The purpose of the test is to verify that RSCP with UE Rx-Tx time difference measurement accuracy in RRC\_INACTIVE 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.6.9. 6.1.1.1-1.

Table A.6.9. 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). 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 INACTIVE, shall be provided to the UE before the start of 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.6.9.6.1.1.2 Test parameters

The RSCP with UE Rx-Tx time difference accuracy test parameters are given in Table A.6.9. 6.1.1.2-1.

Table A.6.9. 6.1.1.2-1: 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 | 1.28s | |
| 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.6.9.6.1.1.3 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 #5----------------------------**

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

### A.7.9.6.1 RSCP with UE Rx-Tx time difference measurements in RRC\_INACTIVE

#### A.7.9.6.1.1 RSCP with UE Rx-Tx time difference measurement accuracy in FR2 SA

##### A.7.9.6.1.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy in RRC\_INACTIVE 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.7.9. 6.1.1.1-1.

**Table A.7.9.** 6.1**.1.1-1: 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 INACTIVE, shall be provided to the UE before the start of 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.7.9.6.1.1.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.7.9. 6.1.1.2-1.

Table A.7.9. 6.1.1.2-1: 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 |
| DRX | s | 1 | 0.64 | |
| 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 |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A |
| PRS configuration |  | 1 | PRS.1.1 FR2 | PRS.1.2 FR2 |
| 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 | -2.41 | -12.12 |
| PRS | dB | 1 | -2 | -10 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -91 | -99 |
| Io | dBm/190.08 MHz | 1 | -54.62 | -54.62 |
| 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: PRS-RSRP 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/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.7.9.6.1.1.3 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 #6: 8-8----------------------------**