**3GPP TSG- Meeting # *R4-22xxxxx***

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **2750** | **rev** | **1** | **Current version:** |  |  |
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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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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
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| ***Category:*** | **F** |  | | | | | ***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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1. Following test cases in R4-2214064 (BigCR) are yet to be implemented:  * Test case for Measurement accuracy with PRS in FR1 with reduced sample number is wrongly implemented. * NR RSTD measurement reporting delay test case for single positioning frequency layer with reduced number of samples in FR2 SA. * NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA without measurement gap. * NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA in RRC\_CONNECTED state with Rx TEG * PRS-RSRP reporting delay test case for reduced number of samples. * PRS-RSRP reporting delay test case for single positioning frequency layer outside MG. * UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA with reduced sample number. * UE Rx-Tx time difference measurements without gaps in FR2 SA. * UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA with multiple RxTx TEGs.  1. A.6.7.14.2 need corrections. 2. A.6.7.14.3 is mistakenly implemented. 3. A.6.9.2.2 needs correction. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. A.7.6.9.X1 is added for NR RSTD measurement reporting delay test case for single positioning frequency layer with reduced number of samples in FR2 SA. 2. A.7.6.9.X2 is added for NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA without measurement gap. 3. A.7.6.9.X3 is added for NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA in RRC\_CONNECTED state with Rx TEG 4. A.7.6.10.X1 is added for PRS-RSRP reporting delay test case for reduced number of samples. 5. A.7.6.10.X2 is added for PRS-RSRP reporting delay test case for single positioning frequency layer outside MG. 6. A.7.6.11.X1 is added for UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA with reduced sample number. 7. A.7.6.11.X2 is added for UE Rx-Tx time difference measurements without gaps in FR2 SA. 8. A.7.6.11.X3 is added for UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA with multiple RxTx TEGs. 9. A.6.7.14.2 is correctly implemented. A.6.7.14.2 is now replaced by A.6.7.14.X1 from BigCR (R4-2214064). 10. Clause A.6.7.14.3 is mistakenly implemented and therefore is removed. 11. A.6.9.2.2 title is updated. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | UE performance for latency reduced positioning measurement cannot be verified.  PRS measurement tests related to Rx TEG and RxTx TEG cannot be conducted. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.7.6.9.X1, A.7.6.9.X2, A.7.6.9.X3, A.7.6.10.X1, A.7.6.10.X2, A.7.6.11.X1, A.7.6.11.X2, A.7.6.11.X3, A.6.7.14.2, A.6.7.14.3, and A.6.9.2.2. | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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>**

A.7.6.9.X1 NR RSTD measurement reporting delay test case for single positioning frequency layer with reduced number of samples in FR2 SA

A.7.6.9.X1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9.2 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured. In this test PRS is transmitted within the active BWP of the UE.

Supported test configurations are shown in table A.7.6.9.X1.1-1. The test parameters are as given in Table 7.6.9.X1.1-2, Table A.7.6.9.X1.1-3 and , Table A.7.6.9.1.1-4.

**Table A.7.6.9.X1.1-1: Supported test configurations for NR RSTD**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel distributed in single positioning frequency layers.

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 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request. UE can support *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED*, and the LMF indicates the UE to perform positioning measurements with reduced number of samples via *reducedDL-PRS-ProcessingSamples*.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #13 before T2.

**Table A.7.6.9.X1.1-2: General test parameters for RSTD measurement reporting delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.2. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| Measurement gap | |  | GP#24 or GP#13 | GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | [1.28] | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

**Table A.7.6.9.X1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.5 FDD | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -58.86 | -60.01 | -60.01 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

**Table A.7.6.9.X1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| **T2** | **T2** | **T2** |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -2 | -5.44 | -5.44 |
| Io | Config 1 | dBm/  9.36MHz | -57.63 | -59.65 | -59.65 |
| PRS | | dB | -3 | -6 | -6 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

A.7.6.9.X1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration X1 specified in section 9.9.1.5 starting from the beginning of time interval T2, where X1 is 2560ms.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

A.7.6.9.X2 NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA without measurement gap

A.7.6.9.X2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the gapless RSTD measurement requirements specified in Clause 9.9.2.7 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured. Reporting delay test for gapless PRS measurement is conducted assuming that the PRS has higher priority, i.e., state 1, than all other DL signals/channels and is transmitted within active DL BWP of UE. Two sub-tests are defined, sub-test 1 is for Nsample = 4 and sub-test 2 is for Nsample = 1. For sub-test 2 LMF indicates UE to perform PRS measurement with Nsample = 1.

Supported test configurations are shown in table A.7.6.9.X2.1-1. The test parameters are as given in Table A.7.6.9.X2.1-2, Table A.7.6.9.X2.1-3, and Table A.7.6.9.X2.1-4.

**Table A.7.6.9.X2.1-1: Supported test configurations for NR RSTD**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel distributed in single positioning frequency layers.

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 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first PRS processing window instance containing the PRS resources.

The UE is configured with PPW before T2.

**Table A.7.6.9.X2.1-2: General test parameters for RSTD measurement reporting delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.4. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| PPW configuration | |  | Table A.3.X-1: Reference PPW configuration | As defined in A.3.X |
| Time offset between serving and neighbour cells | | μs | * set to the UE reported capability for receive time difference threshold if the UE reported value is < 3µs * 3µs otherwise | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | 0 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | Same as time offset | The corresponding parameter in the DL-TDOA assistance ta specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | ms | 10 | The length of the time interval that follows after time interval T1 and processing time of assistance data. In this test UE is configured to measure single PFL within the configured PPW. |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

**Table A.7.6.9.X2.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.5 FDD | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -58.86 | -60.01 | -60.01 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

**Table A.7.6.9.X2.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | **Cell 2** | | **Cell 3** | |
| **Sub-test 1** | **Sub-test 2** | **Sub-test 1** | **Sub-test 2** | **Sub-test 1** | **Sub-test 2** |
| RF Channel Number | |  | 1 | | 1 | | 1 | |
| Positiong frequency layer | |  | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | | OP.1 | | OP.1 | |
| PRACH configuration | |  | FR2 PRACH configuration 1 | | FR2 PRACH configuration 1 | | FR2 PRACH configuration 1 | |
| Note 3 | Config 1 | dBm/SCS | -89 | | -89 | | -89 | |
| PRS | Config 1 | dB | -6 | -3 | -13 | 5 | -13 | 5 |
| Io | Config 1 | dBm/  9.36MHz | -59.65 | | -59.92 | | -59.92 | |
| PRS | | dB | -6 | -3 | -13 | 5 | -13 | 5 |
| PRS-RSRP Note 4 | | dBm/SCS | -95 | -92 | -102 | -84 | -102 | -84 |
| Propagation Condition | |  | AWGN | | | | | |
| Note 1: OCNG shall be used such that active 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: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | | | | |

A.7.6.9.X2.2 Test Requirements

The RSTD measurement time fulfils the gapless RSTD measurement reporting delay requirements specified in Clause 9.9.2.7.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.2.7 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

A.7.6.9.X3 NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA in RRC\_CONNECTED state with Rx TEG

A.7.6.9.X3.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the Rx TEG based measurement period requirements specified in Clause 9.9.2.5 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

Supported test configurations are shown in table A.7.6.9.X3.1-1. The test parameters are as given in Table A7.6.9.X3.1-2, Table A.7.6.9.X3.1-3 and, Table A.7.6.9.X3.1-4.

**Table A.7.6.9.X3.1-1: Supported test configurations for NR RSTD**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel distributed in single positioning frequency layers.

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 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #13 before T2.

The test applies to the UE supporting Rx TEG indicated via *NR-UE-TEG-Capability* and is requested to provide the Rx TEG in the test via *nr-UE-RxTEG-Request-r17* in *NR-TDOA-RequestLocationInformation*. In the location request *measureSameDL-PRS-ResourceWithDifferentRxTEGs-r17* is set to n0. The UE shall perform and optionally report the Rx TEG based RSTD measurements.

The UE is capable of performing Rx TEG based RSTD measurements. UE may or may not be able to receive same DL PRS resource from the same TRP simultaneously from multiple Rx TEGs*.*

**Table A.7.6.9.X3.1-2: General test parameters for RSTD measurement reporting delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.4. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| Measurement gap | |  | GP#24 or GP#13 | GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | [1.28\*]Note 1 | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |
| Note 1:   * = if UE is capable of receiving the same DL PRS resource from the same TRP simultaneously from multiple Rx TEGs, where is the maximum number of Rx TEGs with which UE can support to measure the same PRS resource, and is the number of Rx TEGs UE can measure simultaneously which is reported via *measureSameDL-PRS-ResourceWithDifferentRxTEGsSimul*. | | | | |

**Table A.7.6.9.X3.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.5 FDD | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -58.86 | -60.01 | -60.01 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

**Table A.7.6.9.X3.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| **T2** | **T2** | **T2** |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.44 | -11.67 | -11.67 |
| Io | Config 1 | dBm/  9.36MHz | -59.65 | -59.92 | -59.92 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

A.7.6.9.X3.2 Test Requirements

The RSTD measurement time fulfils the Rx TEG based RSTD measurement period requirements specified in Clause 9.9.2.5. The UE shall perform and report the Rx TEG based RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.2.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD\_0000000 and RSTD1970049.

**<End of Change 1>**

**<Start of Change 2>**

A.7.6.10.X1 PRS-RSRP reporting delay test case for reduced number of samples

A.7.6.10.X1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements for reduced number of samples specified in Clause 9.9.3.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.7.6.10.X1.1-1. In this test PRS is transmitted within the active BWP of the UE.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. UE can support *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED*, and the LMF indicates the UE to perform positioning measurements with reduced number of samples via *reducedDL-PRS-ProcessingSamples*.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.6.10.X1.1-2, and table A.7.6.10.X1.1-3.

**Table A.7.6.10.X1.1-1: supported test configurations for PRS RSRP measurement for FR2-FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.6.10.X1.1-2: General test parameters for PRS RSRP measurement reporting delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| Gap Pattern Id |  | Config 1 | GP#13 or GP#24Note1 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| A3-Offset | dB | Config 1 | -6 |  |
| Hysteresis | dB | Config 1 | 0 |  |
| CP length |  | Config 1 | Normal |  |
| TimeToTrigger | s | Config 1 | 0 |  |
| Filter coefficient |  | Config 1 | 0 | L3 filtering is not used |
| DRX |  | Config 1 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | Synchronous cells. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |
| Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

**Table A.7.6.10.X1.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  | |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS BW | |  | Config 1 | 48 PRBs | | 48 PRBs | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | ‘01’ | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| 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 | | dB | Config 1 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| EPRE ratio of PRS to SSS | |  |  |  | |  | |
| Note2 | | dBm/15kHz Note5 |  | -102 | | -102 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | -93 | |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -93 | -Infinity | -96 |
| PRS | | dB | Config 1 | -Infinity | -1.76 | -Infinity | -6.01 |
| PRS | | dB | Config 1 | -Infinity | 0 | -Infinity | -3 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -60.03 | | -60.03 | |
| Propagation Condition | |  | Config 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: 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 | | | | | | | |

A.7.6.10.X1.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9.3.5. The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.3.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

A.7.6.10.X2 PRS-RSRP reporting delay test case for single positioning frequency layer outside MG

A.7.6.10.X2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement outside MG requirements specified in Clause 9.9.3.6 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. There are two sub-tests in the test, sub-test 1 is to verify the delay requirements with Nsample=1, and sub-test 2 is to verify the delay requirements with Nsample=4.

Supported test configurations are shown in table A.7.6.10.X2.1-1

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In sub-test 1, *requestedDL-PRS-ProcessingSamples* shall be included in the location information request and set to ‘m1’, and *lowerRxBeamSweepingThan8-FR2* shall be included.

During T1, a PPW shall be configured for the PCell and be activated via DL MAC CE. The last PDSCH containing the MAC CE shall be transmitted before slot #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first PPW instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The general test parameters are as given in table A.7.6.10.X2.1-2, and cell specific test parameters during T2 are listed in table A.7.6.10.X2.1-3.

**Table A.7.6.10.X2.1-1: supported test configurations for PRS RSRP measurement for FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.6.10.X2.1-2: General test parameters for PRS RSRP measurement reporting delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| PPW configuration |  | Config 1 | TBD |  |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| CP length |  | Config 1 | Normal |  |
| DRX |  | Config 1 | OFF | DRX is not used |
| Time offset between serving and neighbour cells | μs | Config 1 | 0.58, 2.0 or 3 Note 1 |  |
| Expected RSTD | μs | Config 1 | 0 |  |
| Expected RSTD uncertainty | μs | Config 1 | Same as time offset between serving and neighbour cells |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 7 |  |
| NOTE 1: If UE indicates support of CP length for the receive time difference threshold, the time offset is set to 0.58us; If UE indicates support of 1/4 symbol length for the receive time difference threshold, the time offset is set to 2.0us, otherwise 3us. | | | | |

**Table A.7.6.10.X2.1-3: Cell-specific test parameters during T2 for PRS RSRP measurement reporting delay**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | | |
|  | |  | **Sub-test 1** | **Sub-test 2** | | **Sub-test 1** | **Sub-test 2** | |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | | Rough | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| Duplex mode | |  | Config 1 | TDD | | | TDD | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | | N/A | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | | N/A | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | | N/A | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | | - | | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | | - | | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | | - | | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | | - | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | | 120 | | |
| PRS configuration | |  | Config 1 | PRS.1.1 FR2 | | | PRS.1.1 FR2 | | |
| PRS muting configuration | |  | Config 1 | ‘10’ | | | ‘01’ | | |
| EPRE ratio of PSS to SSS | |  |  |  | | |  | | |
| 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 | |  | Config 1 | 0 | | | 0 | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | |  | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | |  | | |
| Note2 | | dBm/15kHz Note5 |  | -102 | | | -102 | | |
| Note2 | | dBm/SCS Note4 | Config 1 | -93 | | | -93 | | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -96 | -96 | | -99 | -103 | |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -96 | -96 | | -99 | -103 | |
| PRS | | dB | Config 1 | -3 | -3 | | -6 | -10 | |
| PRS | | dB | Config 1 | -3 | -3 | | -6 | -10 | |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -62.25 | | -62.25 | -63.04 | | -63.60 |
| Propagation Condition | |  | Config 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: SS-RSRP/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 | | | | | | | | | |

A.7.6.10.X2.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9.3.6, with Nsample=1 for sub-test 1 and Nsample=4 for sub-test 2. The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.3.6 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

**<End of Change 2>**

**<Start of Change 3>**

#### A.7.6.11.X1 UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA with reduced sample number

##### A.7.6.11.X1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 with Nsample = 1 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured. In this test PRS is transmitted within the active BWP of the UE. UE can support *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED*, and the LMF indicates the UE to perform positioning measurements with reduced number of samples via *reducedDL-PRS-ProcessingSamples*.

The supported test configurations in listed in Table A.7.6.11.X1.1-1.

Table A.7.6.11.X1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB and PRS SCS, 100 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 test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. *requestedDL-PRS-ProcessingSamples* and shall be included in the location information request and set to ‘m1’, and *lowerRxBeamSweepingThan8-FR2* shall be included. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID #13 or ID #24 before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.X1.1-2 and Table A.7.6.11.X1.1-3 respectively.

Table A.7.6.11.X1.1-2: 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 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 1 |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

Table A.7.6.11.X1.1-3: 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 | |
| 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 | -Infinity | -6 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -6 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -95 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -91 | -91 | -95 | -95 |
| Io | dBm/95.04 MHz | 1 | N/A | -57.88 | N/A | -59.04 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: SS-RSRP, 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 | | | | | | |

##### A.7.6.11.X1.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5 with Nsample=1.

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

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

A.7.6.11.X2 UE Rx-Tx time difference measurements without gaps in FR2 SA

A.7.6.11.X2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.6 in AWGN propagation condition in FR2 in standalone scenario. There are two sub-tests in the test, sub-test 1 is to verify the delay requirements with Nsample=1, and sub-test 2 is to verify the delay requirements with Nsample=4.

The supported test configurations in listed in Table A.7.6.11.X2.1-1.

**Table A.7.6.11.X2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 100 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 test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of PRS processing window containing the PRS resources.

The UE is configured with PRS processing window before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.X2.1-2 and Table A.7.6.11.X2.1-3 respectively.

**Table A.7.6.11.X2.1-2: 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 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| PRS processing window |  | TBD | TBD |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 0.58, 2.25 or 3 Note 1 |  |
| Expected RSTD | μs | 1 | 0 |  |
| Expected RSTD uncertainty | μs | 1 | Same as time offset between serving and neighbour cells |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |
| NOTE 1: The value is up to the UE capability. The possible UE capability value: (1/4 symbol, 1/2 symbol, CP length, half of slot). When the UE reported value is > 3us, the time offset between serving and neighbour cells is set to 3us; when the UE reported value is < 3us, the time offset between serving and neighbour cells is set to the UE reported value. | | | | |

**Table A.7.6.11.X2.1-3: Cell specific test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  |  | **Sub-test 1** | **Sub-test 2** | **Sub-tets 1** | **Sub-test 2** |
| 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 | |
| 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 | 48 PRBs | 24 PRBs | 48 PRBs | 24 PRBs |
| 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 | -3 | -2.41 | -6 | -12.12 |
| PRS | dB | 1 | -1.44 | -2 | -3.65 | -10 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -90.44 | -91 | -92.65 | -99 |
| Io | dBm/95.04 MHz | 1 | -56.65 | -57.63 | -56.65 | -57.63 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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 | | | | | | |

A.7.6.11.X2.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.6.

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

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

A.7.6.11.X3 UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA with multiple RxTx TEGs

A.7.6.11.X3.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured, and when UE is requested to measure a PRS resource with multiple RxTx TEGs.

The supported test configurations in listed in Table A.7.6.11.X3.1-1.

**Table A.7.6.11.X3.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB and PRS SCS, 100 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 test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The test applies to the UE supporting RxTx TEG indicated via *NR-UE-TEG-Capability* and is requested to provide the RxTx TEG in the test via *nr-UE-RxTxTEG-Request-r17* in *nr-Multi-RTT-RequestLocationInformation*. The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request. In *nr-Multi-RTT-RequestLocationInformation*, *measureSameDL-PRS-ResourceWithDifferentRxTEGs-r17* shall be set to ‘n2’.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID #13 or ID #24 before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.X3.1-2 and Table A.7.6.11.X3.1-3 respectively.

**Table A.7.6.11.X3.1-2: 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 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.2 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 1 |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 20 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | |

**Table A.7.6.11.X3.1-3: 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 | |
| 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 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/95.04 MHz | 1 | N/A | -57.63 | N/A | -57.63 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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 | | | | | | |

A.7.6.11.X3.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5, with =2 if UE does not support or indicate value ‘n1’ for *measureSameDL-PRS-ResourceWithDifferentRxTEGsSimul*, and =1 otherwise.

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

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

**<End of Change 3>**

**<Start of Change 4>**







A.6.7.14.2 SA: measurement accuracy with PRS in FR1 with reduced sample number

A.6.7.14.2.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement with reduced sample number is within the specified limits provided that PRS is transmitted within the active BWP of the UE. UE can support *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED*, and the LMF indicates the UE to perform positioning measurements with reduced number of samples via *reducedDL-PRS-ProcessingSamples*. This test will verify the requirements in clauses 10.1.24.2.1 and 10.1.24.2.2.

A.6.7.14.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.14.2.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in A.6.7.14.2.2-2. In all test cases, Cell 1 is the PCell.

**Table A.6.7.14.2.2-1: PRS-RSRP supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

**Table A.6.7.14.2.2-2: PRS-RSRP test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | |
|  | | |  | **Cell 1** | **Cell 2** |
| Cell ID | | |  | 489 | 0 |
| SSB ARFCN | | |  | freq1 | |
| Duplex mode | | Config 1 |  | FDD | |
|  | | Config 2,3 |  | TDD | |
| TDD configuration | | Config 1 |  | Not Applicable | |
|  | | Config 2 |  | TDDConf.1.1 | |
|  | | Config 3 |  | TDDConf.2.1 | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | |
|  | | Config 2 |  | 10: NRB,c = 52 | |
|  | | Config 3 |  | 40: NRB,c = 106 | |
| BWP BW | | Config 1 |  | 10: NRB,c = 52 | |
|  | | Config 2 |  | 10: NRB,c = 52 | |
|  | | Config 3 |  | 40: NRB,c = 106 | |
| 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 | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | NA |
|  | | Config 2 |  | TRS.1.1 TDD | NA |
|  | | Config 3 |  | TRS.1.2 TDD | NA |
| DRX Cycle | | | ms | Not Applicable | |
| Measurement gap | | |  | GP#24 or GP#0 Note 7 | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | - |
|  | | Config 2 |  | SR.1.1 TDD |  |
|  | | Config 3 |  | SR2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | - |
|  | | Config 2 |  | CR.1.1 TDD |  |
|  | | Config 3 |  | CR2.1 TDD |  |
| Control channel RMC | | Config 1 |  | CCR.1.1 FDD | - |
|  | | Config 2 |  | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR2.1 TDD |  |
| PRS configuration | | Config 1 |  | PRS.1.4 FR1 | PRS.1.4 FR1 |
|  | | Config 2 |  | PRS.1.4 FR1 | PRS.1.4 FR1 |
|  | | Config 3 |  | PRS.2.4 FR1 | PRS.2.4 FR1 |
| PRS BW | | Config 1 | RB | 52 | 52 |
| Config 2 | 52 | 52 |
| Config 3 | 106 | 106 |
| PRS Resource slot offset (slot) | | Config 1,2,3 | slot | 0 | 4 |
| SSB configuration | | Config 1 |  | SSB.1 FR1 | SSB.1 FR1 |
|  | | Config 2 |  | SSB.1 FR1 | SSB.1 FR1 |
|  | | Config 3 |  | SSB.2 FR1 | SSB.2 FR1 |
| Time offset with Cell 1 | | Config 1 | ms | - | 3 |
|  | | Config 2,3 | μs | - | 3 |
| SMTC configuration | | Config 1 |  | SMTC.2 | |
| Config 2,3 |  | SMTC.1 | |
| OCNG Patterns | | |  | OCNG pattern 1 | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | |
| Config 3 |  | |
| 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 | | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |
| Note2 | Config 1,2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6, NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B,  NR\_TDD\_FR1\_C,  NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D,  NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E,  NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G,  NR\_FDD\_FR1\_H | dBm/15KhZ | -106 | |
| Config 3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6, NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B,  NR\_TDD\_FR1\_C,  NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D,  NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E,  NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G,  NR\_FDD\_FR1\_H | Not applicableNote 5 | |
| Note2 | Config 1,2 | | dBm/SCS | -106 | |
| Config 3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6, NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B,  NR\_TDD\_FR1\_C,  NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D,  NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E,  NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G,  NR\_FDD\_FR1\_H | Not applicableNote 5 | |
|  | | | dB | -6 | -6 |
|  | | | dB | -6 | -6 |
| SS-RSRP | | | dB | Same as PRS-RSRP | |
| PRS-RSRP Note3 | Config 1, 2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6, NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B,  NR\_TDD\_FR1\_C,  NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D,  NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E,  NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G,  NR\_FDD\_FR1\_H | dBm/SCS | -112 | -112 |
|  | Config 3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6, NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B,  NR\_TDD\_FR1\_C,  NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D,  NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E,  NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G,  NR\_FDD\_FR1\_H |  | Not applicable Note 5 | Not applicable Note 5 |
| IoNote3 | Config 1,2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6, NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B,  NR\_TDD\_FR1\_C,  NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D,  NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E,  NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G,  NR\_FDD\_FR1\_H | dBm/9.36MHz | -77.07 | |
| Config 3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 6, NR\_SDL\_FR1\_A,  NR\_FDD\_FR1\_B,  NR\_TDD\_FR1\_C,  NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D,  NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E,  NR\_FDD\_FR1\_F,  NR\_FDD\_FR1\_G,  NR\_FDD\_FR1\_H | dBm/38.16MHz | Not applicable Note 5 | |
| Propagation condition | | |  | AWGN | |
| Antenna configuration | | |  | 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.  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: SS-RSRP and 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: Subtest 1 is not used when testing with 30kHz SSB SCS.  Note 6: 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  Note 7: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | | |

A.6.7.14.2.3 Test Requirements

In the test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.24.2.1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1.24.2.2.

**<End of Change 4>**

**<Start of Change 5>**

#### A.6.7.14.3 Void

##### A.6.7.14.3.1 Void

##### A.6.7.14.3.2 Void

**Table A.6.7.14.3.2-1: Void**



**Table A.6.7.14.3.2-2: Void**



A.6.7.14.3.3 Void

**<End of Change 5>**

**<Start of Change 6>**

#### A.6.9.2.2 SA: measurement accuracy with PRS in FR1 with reduced number of samples in RRC\_INACTIVE state

##### A.6.9.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRP measurement accuracy is within the specified limits provided that PRS is transmitted within the initial BWP of the UE. UE can support *supportedDL-PRS-ProcessingSamples-INACTIVE*, and the LMF indicates the UE to perform positioning measurements with reduced number of samples via *reducedDL-PRS-ProcessingSamples*. This test will verify the requirements in clauses 10.1.24.2.1 and 10.1.24.2.2.

##### A.6.9.2.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.9.2.2.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in A.6.9.2.2.2-2. In all test cases, Cell 1 is the PCell.

Table A.6.9.2.2.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

Table A.6.9.2.2.2-2: PRS-RSRP test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
|  | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID | |  | 489 | 0 | 489 | 0 |
| SSB ARFCN | |  | freq1 | | freq1 | |
| Duplex mode | Config 1 |  | FDD | | | |
|  | Config 2,3 |  | TDD | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | |
|  | Config 2 |  | TDDConf.1.1 | | | |
|  | Config 3 |  | TDDConf.2.1 | | | |
| BWchannel | Config 1 | MHz | 10: NRB,c = 52 | | | |
|  | Config 2 |  | 10: NRB,c = 52 | | | |
|  | Config 3 |  | 40: NRB,c = 106 | | | |
| BWP BW | Config 1 |  | 10: NRB,c = 52 | | | |
|  | Config 2 |  | 10: NRB,c = 52 | | | |
|  | Config 3 |  | 40: NRB,c = 106 | | | |
| Downlink initial BWP configuration | |  | DLBWP.0.1 | | | |
| Uplink initial BWP configuration | |  | ULBWP.0.1 | | | |
| DRX Cycle | | s | 1.28 | | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | - | SR.1.1 FDD | - |
|  | Config 2 |  | SR.1.1 TDD |  | SR.1.1 TDD |  |
|  | Config 3 |  | SR2.1 TDD |  | SR2.1 TDD |  |
| RMSI CORESET Reference Channel | Config 1 |  | CR.1.1 FDD | - | CR.1.1 FDD | - |
|  | Config 2 |  | CR.1.1 TDD |  | CR.1.1 TDD |  |
|  | Config 3 |  | CR2.1 TDD |  | CR2.1 TDD |  |
| Control channel RMC | Config 1 |  | CCR.1.1 FDD | - | CCR.1.1 FDD | - |
|  | Config 2 |  | CCR.1.1 TDD |  | CCR.1.1 TDD |  |
|  | Config 3 |  | CCR2.1 TDD |  | CCR2.1 TDD |  |
| PRS configuration | Config 1 |  | PRS.1.1 FR1 | PRS.1.1 FR1 | PRS.1.1 FR1 | PRS.1.1 FR1 |
|  | Config 2 |  | PRS.1.1 FR1 | PRS.1.1 FR1 | PRS.1.1 FR1 | PRS.1.1 FR1 |
|  | Config 3 |  | PRS.2.1 FR1 | PRS.2.1 FR1 | PRS.2.1 FR1 | PRS.2.1 FR1 |
| PRS BW | Config 1 |  | 48 PRBs | 48 PRBs | 48 PRBs | 48 PRBs |
| Config 2 | 48 PRBs | 48 PRBs | 48 PRBs | 48 PRBs |
| Config 3 | 48 PRBs | 48 PRBs | 48 PRBs | 48 PRBs |
| PRS Resource slot offset (slot) | Config 1,2,3 | slot | 0 | 4 | 0 | 4 |
| SSB configuration | Config 1 |  | SSB.1 FR1 | SSB.1 FR1 | SSB.1 FR1 | SSB.1 FR1 |
|  | Config 2 |  | SSB.1 FR1 | SSB.1 FR1 | SSB.1 FR1 | SSB.1 FR1 |
|  | Config 3 |  | SSB.2 FR1 | SSB.2 FR1 | SSB.2 FR1 | SSB.2 FR1 |
| Time offset with Cell 1 | Config 1 | ms | - | 3 | - | 3 |
|  | Config 2,3 | μs | - | 3 | - | 3 |
| SMTC configuration | Config 1 |  | SMTC.2 | | | |
| Config 2,3 |  | SMTC.1 | | | |
| OCNG Patterns | |  | OCNG pattern 1 | | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2 | kHz | 15 kHz | | | |
| Config 3 | 30 kHz | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | 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 | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| EPRE ratio of PRS to SSS | |
| Note2 | Config 1,2 | dBm/15Khz | -98 | | -98 | |
| Config 3 |
| Note2 | Config 1,2 | dBm/SCS | -98 | | -98 | |
| Config 3 | -95 | | -95 | |
|  | | dB | -3 | -6 | -3 | -6 |
|  | | dB | -1.44 | -3.65 | -1.44 | -3.65 |
| PRS-RSRP Note3 | Config 1, 2 | dBm/SCS | -99.44 | -101.65 | -99.44 | -101.65 |
| Config 3 | -96.44 | -98.65 | -96.44 | -98.65 |
| IoNote3 | Config 1,2 | dBm/9.36MHz | -66.73 | | -66.73 | |
| Config 3 | dBm/38.16MHz | -60.62 | | -60.62 | |
| Propagation condition | |  | AWGN | | | |
| Antenna configuration | |  | 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.  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. | | | | | | |

##### A.6.9.2.2.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.24.2.1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1.24.2.2.

**<End of Change 6>**