**3GPP TSG-RAN WG4 Meeting #113 R4-241XXX**

**Orlando, US, 18th – 22nd November, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **5005** | **rev** | **1** | **Current version:** | **17.15.0** |  |
|  | | | | | | | | |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <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:*** | (NR\_pos\_enh-Perf) CR on test cases of R17 positioning | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | CATT | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh-Perf | | | | |  | ***Date:*** | | | 2024-10-31 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories 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:*** | | 1. The test cases of PRS-RSRPP measurement delay and accuracy requirements should be defined with Two-tap channel rather than AWGN channel. 2. The unit of Io in clause A.6.6.16.1 is incorrect. 3. The value of Es/Noc and Es/Iot in some test cases are incorrect. 4. The channel bandwidth in clause A.7.6.12.1 is incorrect. 5. In FR2 PRS-RSRPP accuracy test cases, the test requirements should be defined for reported RSRPP rather than RSRP. 6. The side condition in A.7.7.13.2 is incorrect which should be [0, -6] for reduced samples. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Correct the channel model used in PRS-RSRPP measurement delay and accuracy requirements. 2. Correct the unit of Io, channel bandwidth and the value of Es/Noc and Es/Iot. 3. Correct the test requirements for FR2 PRS-RSRPP accuracy tests. 4. Correct the side condition for reduced samples in A.7.7.13.2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | 1. The test cases for PRS-RSRPP measurement are incorrect. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.6.6.16, A.6.7.16, A.6.8.4, A.6.9.4, A.7.6.12, A.7.7.13, A.7.8.4, A.7.9.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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>

### A.6.6.16 PRS-RSRPP measurements

#### A.6.6.16.1 PRS-RSRPP reporting delay test case for single positioning frequency layer in FR1 in RRC\_CONNECTED state

##### A.6.6.16.1.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement meets the delay requirements specified in clause 9.9.6.5 in an environment with two-tap channel.

The supported test configurations are specified in Table A.6.6.16.1.1-1.

Table A.6.6.16.1.11: 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. | |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cell. Both cells are on the same NR RF channel in FR1. The test consists of two consecutive time intervals, with duration of T1 and T2. 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.

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 general test parameters are listed in Table A.6.6.16.1.1-2, and cell specific test parameters are listed in Table A.6.6.16.1.1-3.

Table A.6.6.16.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Reference cell |  | 1, 2, 3 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1 | 20: NRB,c = 106 |  |
| 2 | 20: NRB,c = 106 |  |
| 3 | 50: NRB,c = 133 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| Measurement gap |  | 1, 2, 3 | GP#24 or GP#0 Note 1 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| DRX |  | 1, 2, 3 | NA | OFF |
| Time offset between serving and neighbour cells | μs | 1, 2, 3 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3 | 5 |  |
| T1 | s | 1, 2, 3 | 2 |  |
| T2 | s | 1, 2, 3 | 5 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

Table A.6.6.16.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| 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.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 2 | PRS.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 3 | PRS.2.4 FR1 | | PRS.2.4 FR1 | |
| PRS muting info |  | 1, 2, 3 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/19.08 MHz | 1 | N/A | -64.57 | N/A | -64.57 |
|  | dBm/19.08 MHz | 2 | -64.57 | -64.57 |
|  | dBm/47.88 MHz | 3 | -60.59 | -60.59 |
| Propagation Condition |  | 1, 2, 3 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.6.6.16.1.2 Test Requirements

The UE shall perform and report the PRS-RSRPP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9.6.5, starting from the beginning of time interval T2.

* NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the time duration above because of TTI insertion uncertainty of the measurement report in DCCH.

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.6.6.16.2 PRS-RSRPP reporting delay test case with reduced number of samples for single positioning frequency layer in FR1 in RRC\_CONNECTED state

##### A.6.6.16.2.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement meets the reduced sample measurement delay requirements specified in clause 9.9.6.5 in an environment with two-tap channel for reduced number of samples. In this test UE that supports *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED* is configured by LMF to perform PRS measurement with reduced number of samples.

The supported test configurations are specified in Table A.6.6.16.2.1-1.

Table A.6.6.16.2.1-1: Supported test configurations

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

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cell. Both cells are on the same NR RF channel in FR1. The test consists of two consecutive time intervals, with duration of T1 and T2. 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.

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 general test parameters are listed in Table A.6.6.16.2.1-2, and cell specific test parameters are listed in Table A.6.6.16.2.1-3.

Table A.6.6.16.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Reference cell |  | 1, 2, 3 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1 | 20: NRB,c = 106 |  |
| 2 | 20: NRB,c = 106 |  |
| 3 | 50: NRB,c = 133 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| Measurement gap |  | 1, 2, 3 | GP#24 or GP#0 Note 1 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| DRX |  | 1, 2, 3 | NA | OFF |
| Time offset between serving and neighbour cells | μs | 1, 2, 3 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3 | 5 |  |
| T1 | s | 1, 2, 3 | 2 |  |
| T2 | s | 1, 2, 3 | 5 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

Table A.6.6.16.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| 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.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 2 | PRS.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 3 | PRS.2.4 FR1 | | PRS.2.4 FR1 | |
|  |  |  |  | |  | |
| PRS muting info |  | 1, 2, 3 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| PRS | dB | 1 | -Infinity | 0 | -Infinity | -6 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1 | -Infinity | 2.23 | -Infinity | -1.73 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -95.77 | -Infinity | -99.73 |
|  |  | 2 | -Infinity | -95.77 | -Infinity | -99.73 |
|  |  | 3 | -Infinity | -92.77 | -Infinity | -96.73 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -100 | -100 | -Infinity | -104 |
| 2 | -100 | -100 | -Infinity | -104 |
| 3 | -97 | -97 | -Infinity | -101 |
| Io | dBm/19.08 MHz | 1 | N/A | -61.71 | N/A | -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 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.6.6.16.2.2 Test Requirements

The UE shall perform and report the PRS-RSRPP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9.6.5, starting from the beginning of time interval T2.

* NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the time duration above because of TTI insertion uncertainty of the measurement report in DCCH.

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.6.6.16.3 PRS-RSRPP reporting delay test case for single positioning frequency layer in FR1 in RRC\_CONNECTED state without measurement gap

##### A.6.6.16.3.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement meets the delay requirements specified in clause 9.9.6.6 in an environment with two-tap channel. 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 reduced number of samples via *reducedDL-PRS-ProcessingSamples*. For sub-test 2 LMF indicates UE to perform PRS measurement with Nsample = 1. The cell specific parameters for sub-test 1 and sub-test 2 are defined in Table A.6.6.16.3.1-3.

The supported test configurations are specified in Table A.6.6.16.3.1-1.

Table A.6.6.16.3.1-1: 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. | |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cell. Both cells are on the same NR RF channel in FR1. The test consists of two consecutive time intervals, with duration of T1 and T2. 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.

The beginning of the time interval T2 shall be aligned with the beginning of the first PRS processing window 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 UE is configured with PPW before start of T2.

The general test parameters are listed in Table A.6.6.16.3.1-2, and cell specific test parameters are listed in Table A.6.6.16.3.1-3.

Table A.6.6.16.3.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Reference cell |  | 1, 2, 3 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1 | 20: NRB,c = 106 |  |
| 2 | 20: NRB,c = 106 |  |
| 3 | 50: NRB,c = 133 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| PPW configuration |  | 1,2,3 | PPW.1 | As defined in A.3.33 |
| CP length |  | 1, 2, 3 | Normal |  |
| DRX |  | 1, 2, 3 | NA | OFF |
| Time offset between serving and neighbour cells | μs | 1, 2, 3 | - set to the UE reported capability for receive time difference threshold if the UE reported value is < 3µs  - 3µs otherwise | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3 | 0 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3 | Same as time offset |  |
| T1 | s | 1, 2, 3 | 2 |  |
| T2 | ms | 1, 2, 3 | 10 | In this test UE is configured to measure single PFL within the configured PPW. |

Table A.6.6.16.3.1-3: Cell specific test parameters T2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **Sub-test 1** | **Sub-test 2** | **Sub-test 1** | **Sub-test 2** |
| 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 | |
| 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.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 2 | PRS.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 3 | PRS.2.4 FR1 | | PRS.2.4 FR1 | |
|  |  |  |  | |  | |
| PRS muting info |  | 1, 2, 3 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1 | -2.41 | 0 | -12.12 | -6 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1 | -2 | 2.23 | -10 | -1.73 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -100 | -95.77 | -108 | -99.73 |
|  |  | 2 | -100 | -95.77 | -108 | -99.73 |
|  |  | 3 | -97 | -92.77 | -105 | -96.73 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -100 | -100 | -104 | -104 |
| 2 | -100 | -100 | -104 | -104 |
| 3 | -97 | -97 | -101 | -101 |
| Io | dBm/19.08 MHz | 1 | -64.57 | -61.71 | -64.57 | -61.71 |
|  | dBm/19.08 MHz | 2 | -64.57 | -61.71 | -64.57 | -61.71 |
|  | dBm/47.88 MHz | 3 | -60.59 | -57.73 | -60.59 | -57.73 |
| Propagation Condition |  | 1, 2, 3 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | |
| 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.6.6.16.3.2 Test Requirements

The UE shall perform and report the PRS-RSRPP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9.6.6, starting from the beginning of time interval T2.

* NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the time duration above because of TTI insertion uncertainty of the measurement report in DCCH.

The rate of correct events observed during repeated tests shall be at least 90%.

# <End of Change 1>

# <Start of Change 2>

### A.6.7.16 PRS-RSRPP measurements

#### A.6.7.16.1 SA: measurement accuracy with PRS in FR1

##### A.6.7.16.1.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRPP measurement in RRC\_CONNECTED is within the specified limits. This test will verify the requirements in clauses 10.1.38.2.

##### A.6.7.16.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.16.1.2-1. Both absolute accuracy of PRS-RSRPP measurements are tested by using the parameters in A.6.7.16.1.2-2. In all test cases, Cell 1 is the PCell.

Table A.6.7.16.1.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | NR 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 in each supported band | |

Table A.6.7.16.1.2-2: PRS-RSRPP 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 | 20: NRB,c = 106 | | | | | |
|  | | Config 2 |  | 20: NRB,c = 106 | | | | | |
|  | | Config 3 |  | 50: NRB,c = 133 | | | | | |
| BWP BW | | Config 1 |  | 20: NRB,c = 106 | | | | | |
|  | | Config 2 |  | 20: NRB,c = 106 | | | | | |
|  | | Config 3 |  | 50: NRB,c = 133 | | | | | |
| 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 | TRS.1.1 FDD | NA | |
|  | | Config 2 |  | TRS.1.1 TDD | | NA | TRS.1.1 TDD | NA | |
|  | | Config 3 |  | TRS.1.2 TDD | | NA | 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 | | - | 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.1.3 FR1 | | PRS.1.3 FR1 | PRS.1.4 FR1 | PRS.1.4 FR1 | |
|  | | Config 2 |  | PRS.1.3 FR1 | | PRS.1.3 FR1 | PRS.1.4 FR1 | PRS.1.4 FR1 | |
|  | | Config 3 |  | PRS.2.3 FR1 | | PRS.2.3 FR1 | PRS.2.4 FR1 | PRS.2.4 FR1 | |
| 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) | | |  |  | |  |  |  | |
| Note2 | Config 1,2 |  | dBm/15KhZ | -98 | | | -98 | | |
| Config 3 |  | -98 | | | -98 | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | -98 | | |
| Config 3 |  | -95 | | | -95 | | |
|  | | | dB | -2.41 | -12.12 | | -2.41 | | -12.12 |
|  | | | dB | -2 | -10 | | -2 | | -10 |
| PRS-RSRP Note3 | Config 1, 2 |  | dBm/SCS | -100 | | -108 | -100 | | -108 |
|  | Config 3 |  | dBm/SCS | -97 | | -105 | -97 | | -105 |
| IoNote3 | Config 1,2 |  | dBm/19.08MHz | -64.57 | | | -64.57 | | |
| Config 3 |  | dBm/47.88MHz | -60.59 | | | -60.59 | | |
| Propagation condition | | |  | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | | | |
| 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-RSRPP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Void.  Note 6: Void.  Note 7: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | | | | | | |

##### A.6.7.16.1.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.38.2.

# <End of Change 2>

# <Start of Change 3>

### A.6.8.4 PRS-RSRPP measurements

#### A.6.8.4.1 PRS-RSRPP reporting delay test case for single positioning frequency layer in FR1 in RRC\_INACTIVE state

##### A.6.8.4.1.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement meets the delay requirements specified in clause 5.6.5.5 in an environment with two-tap channel.

The supported test configurations are specified in Table A.6.8.4.1.1-1.

Table A.6.8.4.1.1-1: 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. | |

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2. During T2 UE shall be in RRC\_INACTIVE state and all both cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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.

The beginning of the time interval T2 shall be aligned with the beginning of the first DRX cycle 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 listed in Table A.6.8.4.1.1-2, and cell specific test parameters are listed in Table A.6.8.4.1.1-3.

Table A.6.8.4.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Reference cell |  | 1, 2, 3 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1 | 20: NRB,c = 106 |  |
| 2 | 20: NRB,c = 106 |  |
| 3 | 50: NRB,c = 133 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| DRX | s | 1, 2, 3 | 1.28 | ON |
| Time offset between serving and neighbour cells | μs | 1, 2, 3 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3 | 5 |  |
| T1 | s | 1, 2, 3 | 2 |  |
| T2 | s | 1, 2, 3 | 5 |  |

Table A.6.8.4.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| 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 UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 2 | PRS.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 3 | PRS.2.4 FR1 | | PRS.2.4 FR1 | |
| PRS muting info |  | 1, 2, 3 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/19.08 MHz | 1 | N/A | -64.57 | N/A | -64.57 |
|  | dBm/19.08 MHz | 2 | -64.57 | -64.57 |
|  | dBm/47.88 MHz | 3 | -60.59 | -60.59 |
| Propagation Condition |  | 1, 2, 3 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | |
| Note 1: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.6.8.4.1.2 Test Requirements

The UE shall perform and report the PRS-RSRPP measurements for Cell 1 and Cell 2, within the time limit specified in clause 5.6.5.5, starting from the beginning of time interval T2.

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

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.6.8.4.2 PRS-RSRPP reporting delay test case for single positioning frequency layer in FR1 in RRC\_INACTIVE state for reduced number of samples

##### A.6.8.4.2.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement meets the delay requirements specified in clause 5.6.5.5 in an environment with two-tap channel for reduced number of samples. In this test UE that supports *supportedDL-PRS-ProcessingSamples-RRC-Inactive* is configured by LMF to perform PRS measurement with reduced number of samples.

The supported test configurations are specified in Table A.6.8.4.2.1-1.

Table A.6.8.4.2.1-1: Supported test configurations

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

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2. During T2 UE shall be in RRC\_INACTIVE state and both cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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.

The beginning of the time interval T2 shall be aligned with the beginning of the first DRX cycle 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 listed in Table A.6.8.4.2.1-2, and cell specific test parameters are listed in Table A.6.8.4.2.1-3.

Table A.6.8.4.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Reference cell |  | 1, 2, 3 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1 | 20: NRB,c = 106 |  |
| 2 | 20: NRB,c = 106 |  |
| 3 | 50: NRB,c = 133 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| DRX | s | 1, 2, 3 | 1.28 | ON |
| Time offset between serving and neighbour cells | μs | 1, 2, 3 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3 | 5 |  |
| T1 | s | 1, 2, 3 | 2 |  |
| T2 | s | 1, 2, 3 | 5 |  |

Table A.6.8.4.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| 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 UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 2 | PRS.1.4 FR1 | | PRS.1.4 FR1 | |
|  | 3 | PRS.2.4 FR1 | | PRS.2.4 FR1 | |
| PRS BW |  | 1,2,3 | 48 PRBs | | 48PRBs | |
| PRS muting info |  | 1, 2, 3 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1 | -Infinity | 0 | -Infinity | -6 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1 | -Infinity | 2.23 | -Infinity | -1.73 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -95.77 | -Infinity | -99.73 |
|  |  | 2 | -Infinity | -95.77 | -Infinity | -99.73 |
|  |  | 3 | -Infinity | -92.77 | -Infinity | -96.73 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -88 | -100 | -Infinity | -104 |
| 2 | -88 | -100 | -Infinity | -104 |
| 3 | -85 | -97 | -Infinity | -101 |
| Io | dBm/19.08 MHz | 1 | N/A | -61.71 | N/A | -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 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | |
| Note 1: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  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. | | | | | | |

##### A.6.8.4.2.2 Test Requirements

The UE shall perform and report the PRS-RSRPP measurements for Cell 1 and Cell 2, within the time limit specified in clause 5.6.5.5, starting from the beginning of time interval T2.

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

The rate of correct events observed during repeated tests shall be at least 90%.

# <End of Change 3>

# <Start of Change 4>

### A.6.9.4 PRS-RSRPP measurements

#### A.6.9.4.1 SA: PRS-RSRPP measurement accuracy in FR1 in RRC INACTIVE

##### A.6.9.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy in FR1 in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clauses 10.1.38.2.

##### A.6.9.4.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.9.4.1.2-1.

Table A.6.9.4.1.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | NR 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 in each supported band | |

Table A.6.9.4.1.2-2: PRS-RSRPP 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 | 20: NRB,c = 106 | | | | |
|  | | Config 2 |  | 20: NRB,c = 106 | | | | |
|  | | Config 3 |  | 50: NRB,c = 133 | | | | |
| BWP BW | | Config 1 |  | 20: NRB,c = 106 | | | | |
|  | | Config 2 |  | 20: NRB,c = 106 | | | | |
|  | | Config 3 |  | 50: NRB,c = 133 | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | NA | TRS.1.1 FDD | NA | |
|  | | Config 2 |  | TRS.1.1 TDD | NA | TRS.1.1 TDD | NA | |
|  | | Config 3 |  | TRS.1.2 TDD | NA | TRS.1.2 TDD | NA | |
| DRX cycle length | | Config 1,2,3 | ms | 1280 | | | | |
| 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.1.3 FR1 | PRS.1.3 FR1 | PRS.1.4 FR1 | PRS.1.4 FR1 | |
|  | | Config 2 |  | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.4 FR1 | PRS.1.4 FR1 | |
|  | | Config 3 |  | PRS.2.3 FR1 | PRS.2.3 FR1 | PRS.2.4 FR1 | PRS.2.4 FR1 | |
| 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) | | |  |  |  |  |  | |
| Note2 | Config 1,2 |  | dBm/15KhZ | -98 | | -98 | | |
| Config 3 |  | -98 | | -98 | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | -98 | | |
| Config 3 |  | -95 | | -95 | | |
|  | | | dB | -2.41 | -12.12 | -2.41 | | -12.12 |
|  | | | dB | -2 | -10 | -2 | | -10 |
| PRS-RSRP Note3 | Config 1, 2 |  | dBm/SCS | -100 | -108 | -100 | | -108 |
|  | Config 3 |  | dBm/SCS | -97 | -105 | -97 | | -105 |
| IoNote3 | Config 1,2 |  | dBm/19.08MHz | -64.57 | | -64.57 | | |
| Config 3 |  | dBm/47.88MHz | -60.59 | | -60.59 | | |
| Propagation condition | | |  | Two-tap channel Note 7 | | | | |
| 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.  Note 5: Void.  Note 6: Void  Note 7: The two-tap channel model is defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz). | | | | | | | | |

##### A.6.9.4.1.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.38.2.

#### A.6.9.4.2 SA: measurement accuracy with reduced PRS samples in FR1 in RRC INACTIVE

##### A.6.9.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy with = 1 in FR1 in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clause10.1.38.2.The UE under test should support *supportedDL-PRS-ProcessingSamples-RRC-Inactive*, and the TE indicates the UE to perform positioning measurements with reduced number of samples. The PRS bandwidth is contained within the initial DL BWP and the power difference between the serving cell SS-RSRP and neighbour cell PRS-RSRP is within 6dB, so that = 1 is assumed.

##### A.6.9.4.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.9.4.2.2-1. Both absolute and relative accuracy of PRS-RSRPP measurements are tested by using the parameters in A.6.9.4.2.2-2. In all test cases, Cell 1 is the PCell.

Table A.6.9.4.2.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | NR 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 in each supported band | |

Table A.6.9.4.2.2-2: PRS-RSRPP 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 | 20: NRB,c = 106 | | |
|  | | Config 2 |  | 20: NRB,c = 106 | | |
|  | | Config 3 |  | 50: NRB,c = 133 | | |
| BWP BW | | Config 1 |  | 20: NRB,c = 106 | | |
|  | | Config 2 |  | 20: NRB,c = 106 | | |
|  | | Config 3 |  | 50: NRB,c = 133 | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | |
| 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 length | | Config 1,2,3 | ms | 1280 | | |
| 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 bandwidth | | Config 1,2,3 |  | 52 PRBs | | 52 PRBs |
| 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 | 30 kHz | | |
| 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 | | dBm/15KhZ | -98 | | |
| Config 3 | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | |
| Config 3 | | -95 | | |
|  | | | dB | 0 | | -6 |
|  | | | dB | 2.23 | | -1.73 |
| PRS-RSRP Note3 | Config 1, 2 | | dBm/SCS | -95.77 | | -99.73 |
|  | Config 3 | | -92.77 | | -96.73 |
| SS-RSRP Note3 | Config 1, 2 | | dBm/SCS | -95.77 | | -99.73 |
| Config 3 | | -92.77 | | -96.73 |
| IoNote3 | Config 1,2 | | dBm/19.08MHz | -61.71 | | |
| Config 3 | | dBm/47.88MHz | -57.73 | | |
| Propagation condition | | |  | Two-tap channel Note5 | | |
| 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, SS-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: The two-tap channel model is defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz). | | | | | | |

##### A.6.9.4.2.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.38.2.

# <End of Change 4>

# <Start of Change 5>

### A.7.6.12 PRS-RSRPP measurements

#### A.7.6.12.1 PRS-RSRPP reporting delay test case for single positioning frequency layer in FR2 in RRC\_CONNECTED state

##### A.7.6.12.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 9.9.6.5 for single positioning frequency layer under two-tap channel in standalone scenario. Supported test configurations are shown in table A.7.6.12.1.1-1

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.

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.7.6.12.1.1-2, and table A.7.6.12.1.1-3.

**Table A.7.6.12.1.1-1: supported test configurations for PRS RSRPP measurement for FR2**

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

**Table A.7.6.12.1.1-2: General test parameters for PRS RSRPP 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.7.6.12.1.1-3: Cell-specific test parameters for PRS RSRPP 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 | 200: NRB,c = 132 | | | 200: NRB,c = 132 | | |
| BWP BW | | MHz | Config 1 | 200: NRB,c = 132 | | | 200: NRB,c = 132 | | |
| 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.1.4 FR2 | | | PRS.1.4 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 |  | -98 | | | -98 | | |
| Note2 | | dBm/SCS Note4 | Config 1 | -89 | | | -89 | | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89 | -89 | | -Infinity | -89 | |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -91 | | -Infinity | -99 | |
| PRS | | dB | Config 1 | -Infinity | -2.41 | | -Infinity | -12.12 | |
| PRS | | dB | Config 1 | -Infinity | -2 | | -Infinity | -10 | |
| IoNote3 | | dBm/190.08 MHz Note5 | Config 1 | -54.00 | | -54.62 | -54.00 | | -54.62 |
| Propagation Condition | |  | Config 1 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | | | |
| 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  Note 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | | |

##### A.7.6.12.1.2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 9.9.6.5.The UE shall perform and report the PRS RSRPP 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 9.9.6.5 starting from the beginning of time interval T2.

* NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the time duration above because of TTI insertion uncertainty of the measurement report in DCCH.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRPP measurement for each correct event shall be within the PRS RSRPP reporting range specified in Clause 10.1.38, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

#### A.7.6.12.2 PRS-RSRPP reporting delay test case for reduced number of samples for single positioning frequency layer in FR2 in RRC\_CONNECTED state

##### A.7.6.12.2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 9.9.6.5 for single positioning frequency layer under two-tap channel in standalone scenario. Supported test configurations are shown in table A.7.6.12.2.1-1. 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*.

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.

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.7.6.12.2.1-2, and table A.7.6.12.2.1-3.

**Table A.7.6.12.2.1-1: supported test configurations for PRS RSRPP measurement for FR2**

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

**Table A.7.6.12.2.1-2: General test parameters for PRS RSRPP 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.7.6.12.2.1-3: Cell-specific test parameters for PRS RSRPP 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 | 200: NRB,c = 132 | | | 200: NRB,c = 132 | | |
| BWP BW | | MHz | Config 1 | 200: NRB,c = 132 | | | 200: NRB,c = 132 | | |
| 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.1.4 FR2 | | | PRS.1.4 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 |  | -98 | | | -98 | | |
| Note2 | | dBm/SCS Note4 | Config 1 | -89 | | | -89 | | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89 | -86.77 | | -Infinity | -90.73 | |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -86.77 | | -Infinity | -90.73 | |
| PRS | | dB | Config 1 | -Infinity | 0 | | -Infinity | -6 | |
| PRS | | dB | Config 1 | -Infinity | 2.23 | | -Infinity | -1.73 | |
| IoNote3 | | dBm/190.08 MHz Note5 | Config 1 | -54.00 | | -51.76 | -54.00 | | -51.76 |
| Propagation Condition | |  | Config 1 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | | | |
| 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  Note 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | | |

##### A.7.6.12.2.2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 9.9.6.5. The UE shall perform and report the PRS RSRPP 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 9.9.6.5 starting from the beginning of time interval T2.

* NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the time duration above because of TTI insertion uncertainty of the measurement report in DCCH.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRPP measurement for each correct event shall be within the PRS RSRPP reporting range specified in Clause 10.1.38, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

#### A.7.6.12.3 PRS-RSRPP reporting delay test case for gapless measurement in FR2

##### A.7.6.12.3.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 9.9.6.6 for single positioning frequency layer under two-tap channel in standalone scenario. 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 reduced number of samples via *reducedDL-PRS-ProcessingSamples*.

The supported test configurations are shown in table A.7.6.12.3.1-1.

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.

The beginning of the time interval T2 shall be aligned with the beginning of the first PRS processing window 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.7.6.12.3.1-2, and table A.7.6.12.3.1-3.

**Table A.7.6.12.3.1-1: supported test configurations for PRS RSRPP measurement for FR2**

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

**Table A.7.6.12.3.1-2: General test parameters for PRS RSRPP 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 | Table A.3.33-1: Reference PPW configuration | As defined in A.3.33 |
| 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 | μs | 1, 2, 3 | - set to the UE reported capability for receive time difference threshold if the UE reported value is < 3µs  - 3µs otherwise | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3 | 0 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3 | Same as time offset |  |
| T1 | s | Config 1 | 5 |  |
| T2 | ms | Config 1 | 10 | In this test UE is configured to measure single PFL within the configured PPW. |

**Table A.7.6.12.3.1-3: Cell-specific test parameters during T2**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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 | 200: NRB,c = 132 | | | 200: NRB,c = 132 | | |
| BWP BW | | MHz | Config 1 | 200: NRB,c = 132 | | | 200: NRB,c = 132 | | |
| 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.1.4 FR2 | | | PRS.1.4 FR2 | | |
| PRS BW | |  |  | 48 PRBs for sub-test 2 | | | 48 PRBs for sub-test 2 | | |
| 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 |  | -98 | | | -98 | | |
| Note2 | | dBm/SCS Note4 | Config 1 | -89 | | | -89 | | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -91 | -86.77 | | -99 | -90.73 | |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -91 | -86.77 | | -99 | -90.73 | |
| PRS | | dB | Config 1 | -2.41 | 0 | | -12.12 | -6 | |
| PRS | | dB | Config 1 | -2 | 2.23 | | -10 | -1.73 | |
| IoNote3 | | dBm/190.08 MHz Note5 | Config 1 | -54.62 | | -51.76 | -54.62 | | -51.76 |
| Propagation Condition | |  | Config 1 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | | | |
| 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: 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  Note 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | | |

##### A.7.6.12.3.2 Test Requirements

The UE shall perform and report the PRS-RSRPP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9.6.5, starting from the beginning of time interval T2.

* NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the time duration above because of TTI insertion uncertainty of the measurement report in DCCH.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%.

# <End of Change 5>

# <Start of Change 6>

### A.7.7.13 PRS-RSRPP measurements

#### A.7.7.13.1 SA measurement accuracy with PRS in FR2

##### A.7.7.13.1.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRPP measurement in RRC\_CONNECTED is within the specified limits. This test will verify the requirements in clauses 10.1.38.2.

##### A.7.7.13.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.13.1.2-1. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.13.1.2-1: PRS-RSRPP supported test configurations

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

Table A.7.7.13.1.2-2: PRS-RSRPP general 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 |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 200: NRB,c = 132 | | 200: NRB,c = 132 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - | Not applicable | - |
| Measurement gap |  | GP#13 or GP#24 Note2 | | | |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PRS configuration |  | PRS.1.3 FR2 | PRS.1.3 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | |
| Antenna configuration |  | 1x2 | 1x2 | 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.  Note 2: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | | |

Table A.7.7.13.1.2-3: PRS-RSRPP OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
|  |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -98 | | Same as Test 1 | |
| Note1 | dBm/SCSNote4 | -89 | | Same as Test 1 | |
|  | dB | -2 | -10 | -2 | -10 |
| Es | dBm/SCSNote4 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -91 | -99 | -91 | -99 |
| BB Note6 | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| IoNote2 | dBm/190.08 MHz Note4 | -54.62 | | -54.62 | |
| 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: PRS\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: 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.  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.7.7.13.1.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.38.2 if the reported PRS-RSRPP is in the range shown in table A.7.7.13.1.2-1.

Table A.7.7.13.1.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RSRPP1 -δ +Gmin ≤ Reported RSRPP(dBm) ≤PRS\_RSRPP1 +δ +Gmax |
| Cell 2 | PRS\_RSRPP2 -δ +Gmin ≤ Reported RSRPP(dBm) ≤PRS\_RSRPP2 +δ +Gmax |
| Note 1: PRS\_RSRPPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRPP absolute accuracy requirement from Table 10.1.38.2.1-2, selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

#### A.7.7.13.2 SA measurement accuracy with reduced PRS samples in FR2

##### A.7.7.13.2.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy with = 1 in FR2 is within the specified limits. This test will verify the requirements in clauses 10.1.38.2.

The UE under test should support *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED*, and the TE indicates the UE to perform positioning measurements with reduced number of samples. The PRS bandwidth is contained within the active BWP and the power difference between the serving cell SS-RSRP and neighbour cell PRS-RSRP is within 6 dB, so that = 1 is assumed.

##### A.7.7.13.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.13.2.2-1. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

**Table A.7.7.13.2.2-1: PRS-RSRPP supported test configurations**

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

**Table A.7.7.13.2.2-2: PRS-RSRPP general test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Cell ID |  | 489 | 0 |
| SSB 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 | - |
| Measurement gap |  | GP#13 or GP#24 Note2 | |
| 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.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 |
| PRS configuration |  | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS bandwidth |  | 48 PRBs | 48 PRBs |
| PRS Resource slot offset | slot | 0 | 4 |
| 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 |  |  |  |
| Propagation conditions |  | Two-tap channel Note3 | |
| 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: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured.  Note 3: The two-tap channel model is defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz). | | | |

Table A.7.7.13.2.2-3: PRS-RSRPP 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 7 |  | Rough | |
| Note1 | dBm/15kHzNote4 | -98 | |
| Note1 | dBm/SCSNote4 | -89 | |
|  | dB | 2.23 | -1.73 |
| Es | dBm/SCSNote4 | - | - |
| PRS\_RPNote2 | dBm/SCS | -86.77 | -90.73 |
| SS\_RPNote2 | dBm/SCS | -86.77 | -90.73 |
| BB Note6 | dB | 0 | -6 |
| IoNote2 | dBm/190.08 MHz Note4 | -54.62 | |
| 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: PRS\_RP, SS\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: 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.  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.7.7.13.2.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.38.2 if the reported PRS-RSRPP is in the range shown in table A.7.7.13.2.3-1.

**Table A.7.7.13.2.3-1: PRS-RSRPP absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RSRPP1 -δ +Gmin ≤ Reported RSRPP(dBm) ≤PRS\_RSRPP1 +δ +Gmax |
| Cell 2 | PRS\_RSRPP2 -δ +Gmin ≤ Reported RSRPP(dBm) ≤PRS\_RSRPP2 +δ +Gmax |
| Note 1: PRS\_RSRPPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRPP absolute accuracy requirement from Table 10.1.38.2.1-2, selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

# <End of Change 6>

# <Start of Change 7>

### A.7.8.4 PRS-RSRPP measurements

#### A.7.8.4.1 PRS-RSRPP reporting delay test case for single positioning frequency layer in FR2 in RRC\_INACTIVE state

##### A.7.8.4.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 5.6.5.5 for single positioning frequency layer under two-tap channel in standalone scenario. Supported test configurations are shown in table A.7.8.4.1.1-1.

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 consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2. During T2 UE shall be in RRC\_INACTIVE state and both cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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.

The beginning of the time interval T2 shall be aligned with the beginning of the first DRX cycle 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.7.8.4.1.1-2, and table A.7.8.4.1.1-3.

Table A.7.8.4.1.1-1: supported test configurations for PRS RSRPP measurement for FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 200 MHz bandwidth, TDD duplex mode |

Table A.7.8.4.1.1-2: General test parameters for PRS RSRPP 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. |
| 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 | s | Config 1 | 0.64 | ON |
| 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 |  |

Table A.7.8.4.1.1-3: Cell-specific test parameters for PRS RSRPP 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 | 200: NRB,c = 132 | | 200: NRB,c = 132 | |
| BWP BW | | MHz | Config 1 | 200: NRB,c = 132 | | 200: NRB,c = 132 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | 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.1.4 FR2 | | PRS.1.4 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 |  | -98 | | -98 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -89 | | -89 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89 | -91 | -Infinity | -99 |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -91 | -Infinity | -99 |
| PRS | | dB | Config 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | | dB | Config 1 | -Infinity | -2 | -Infinity | -10 |
| IoNote3 | | dBm/190.08 MHz Note5 | Config 1 | -56.97 | -54.62 | -56.97 | -54.62 |
| Propagation Condition | |  | Config 1 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | |
| 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: 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.7.8.4.1.2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 5.6.5.5.The UE shall perform and report the PRS RSRPP 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 5.6.5.5 starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be higher than the time duration above because of the uncertainty in acquiring the first available PRACH occasion to transition to RRC\_CONNECTED state to report the measurements.The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRPP measurement for each correct event shall be within the PRS RSRPP reporting range specified in Clause 10.1.X, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

#### A.7.8.4.2 PRS-RSRPP reporting delay test with reduced number of samples for single positioning frequency layer in FR2 in RRC\_INACTIVE state

##### A.7.8.4.2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement requirements specified in Clause 5.6.5.5 for single positioning frequency layer under two-tap channel in standalone scenario for reduced number of samples. In this test UE that supports *supportedDL-PRS-ProcessingSamples-RRC-Inactive* is configured by LMF to perform PRS measurement with reduced number of samples. Supported test configurations are shown in table A.7.8.4.2.1-1.

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 consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2. During T2 UE shall be in RRC\_INACTIVE state and both cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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.

The beginning of the time interval T2 shall be aligned with the beginning of the first DRX cycle 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.7.8.4.2.1-2, and table A.7.8.4.2.1-3.

Table A.7.8.4.2.1-1: supported test configurations for PRS RSRPP measurement for FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 200 MHz bandwidth, TDD duplex mode |

Table A.7.8.4.2.1-2: General test parameters for PRS RSRPP 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. |
| 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 | s | Config 1 | 0.64 | ON |
| 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 |  |

Table A.7.8.4.2.1-3: Cell-specific test parameters for PRS RSRPP 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 | 200: NRB,c = 132 | | | 200: NRB,c = 132 | | |
| BWP BW | | MHz | Config 1 | 200: NRB,c = 132 | | | 200: NRB,c = 132 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | | 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.1.4 FR2 | | | PRS.1.4 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 | |  | 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 |  | -98 | | | -98 | | |
| Note2 | | dBm/SCS Note4 | Config 1 | -89 | | | -89 | | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89 | -86.77 | | -Infinity | -90.73 | |
| PRS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -Infinity | -86.77 | | -Infinity | -90.73 | |
| PRS | | dB | Config 1 | -Infinity | 0 | | -Infinity | -6 | |
| PRS | | dB | Config 1 | -Infinity | 2.23 | | -Infinity | -1.73 | |
| IoNote3 | | dBm/190.08 MHz Note5 | Config 1 | -54.00 | | -51.76 | -54.00 | | -51.76 |
| Propagation Condition | |  | Config 1 | Two-tap channel defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | | | | | |
| 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  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.7.8.4.2.2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 5.6.5.5. The UE shall perform and report the PRS RSRPP 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 5.6.5.5 starting from the beginning of time interval T2.

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

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRPP measurement for each correct event shall be within the PRS RSRPP reporting range specified in Clause 10.1.38, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

# <End of Change 7>

# <Start of Change 8>

### A.7.9.4 PRS-RSRPP measurements

#### A.7.9.4.1 SA measurement accuracy in FR2 in RRC INACTIVE

##### A.7.9.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clauses 10.1.38.2.

##### A.7.9.4.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.9.4.1.2-1. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.7.9.4.1.2-1.

Table A.7.9.4.1.2-1: PRS-RSRPP supported test configurations

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

Table A.7.9.4.1.2-2: PRS-RSRPP general 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 |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 200: NRB,c = 132 | | 200: NRB,c = 132 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| DRX cycle configuration | ms | 640 | | | |
| TRS configuration |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.3 | OP.3 | OP.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PRS configuration |  | PRS.1.3 FR2 | PRS.1.3 FR2 | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| 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\_DMRS |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |  |
| Propagation conditions |  | Two-tap channel Note 2 | | | |
| 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: The two-tap channel model is defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz). | | | | | |

Table A.7.9.4.1.2-3: PRS-RSRPP OTA related test parameters

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | | Test 1 | | | Test 2 | | |
|  | |  | | Cell 1 | | Cell 2 | Cell 1 | | Cell 2 |
| Angle of arrival configuration | |  | | Setup 1 according to clause A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 | |  | | Rough | | | Rough | | |
| Note1 | | dBm/15kHzNote4 | | -98 | | | Same as Test 1 | | |
| Note1 | | dBm/SCSNote4 | | -89 | | | Same as Test 1 | | |
|  | | dB | | -2 | | -10 | -2 | | -10 |
| Es | | dBm/SCSNote4 | | - | | - | - | | - |
| PRS\_RPNote2 | | dBm/SCS | | -91 | | -99 | -91 | | -99 |
| BB Note6 | | dB | | -2.41 | | -12.12 | -2.41 | | -12.12 |
| IoNote2 | | dBm/190.08 MHz Note4 | | -54.62 | | | -54.62 | | |
| 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: PRS\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: 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.  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.7.9.4.1.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.38.2. if the reported PRS-RSRPP is in the range shown in table A.7.9.4.1.3-1.

Table A.7.9.4.1.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RSRPP1 -δ +Gmin ≤ Reported RSRPP(dBm) ≤PRS\_RSRPP1 +δ +Gmax |
| Cell 2 | PRS\_RSRPP2 -δ +Gmin ≤ Reported RSRPP(dBm) ≤PRS\_RSRPP2 +δ +Gmax |
| Note 1: PRS\_RSRPPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRPP absolute accuracy requirement from Table 10.1.38.2.1-2, selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

#### A.7.9.4.2 SA measurement accuracy with reduced PRS samples in FR2 in RRC INACTIVE

##### A.7.9.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy with = 1 in FR2in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clause 10.1.38.2.The UE under test should support *supportedDL-PRS-ProcessingSamples-RRC-Inactive*, and the TE indicates the UE to perform positioning measurements with reduced number of samples. The PRS bandwidth is contained within the initial DL BWP and the power difference between the serving cell SS-RSRP and neighbour cell PRS-RSRP is within 6dB, so that = 1 is assumed.

##### A.7.9.4.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.9.4.2.2-1. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.9.4.2.2-1: PRS-RSRPP supported test configurations

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

Table A.7.9.4.2.2-2: PRS-RSRPP general test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | |
|  |  | **Cell 1** | **Cell 2** |
| Cell ID |  | 489 | 0 |
| SSB ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 200: NRB,c = 132 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - |
| DRX cycle configuration | ms | 640 | |
| 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.3 | OP.3 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 |
| PRS configuration |  | PRS.1.4 FR2 | PRS.1.4 FR2 |
| PRS bandwidth |  | 64 PRBs | 64 PRBs |
| PRS Resource slot offset | slot | 0 | 4 |
| 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 |  |  |  |
| Propagation conditions |  | Two-tap channel Note 2 | |
| 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: The two-tap channel model is defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz). | | | |

Table A.7.9.4.2.2-3: PRS-RSRPP 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 7 |  | Rough | |
| Note1 | dBm/15kHzNote4 | -98 | |
| Note1 | dBm/SCSNote4 | -89 | |
|  | dB | 2.23 | -1.73 |
| Es | dBm/SCSNote4 | - | - |
| PRS\_RPNote2 | dBm/SCS | -86.77 | -90.73 |
| SS\_RPNote2 | dBm/SCS | -86.77 | -90.73 |
| BB Note6 | dB | 0 | -6 |
| IoNote2 | dBm/190.08 MHz Note4 | -51.76 | |
| 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: PRS\_RP, SS\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: 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.  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.7.9.4.2.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1.38.2 if the reported PRS-RSRPP is in the range shown in table A.7.9.4.2.3-1.

Table A.7.9.4.2.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RSRPP1 -δ +Gmin ≤ Reported RSRPP(dBm) ≤PRS\_RSRPP1 +δ +Gmax |
| Cell 2 | PRS\_RSRPP2 -δ +Gmin ≤ Reported RSRPP(dBm) ≤PRS\_RSRPP2 +δ +Gmax |
| Note 1: PRS\_RSRPPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration.  Note 2: δ is the RSRPP absolute accuracy requirement from Table 10.1.38.2.1-2, selected according to the Io used in the test.  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.6.1-1, selected according to the UE power class | |

# <End of Change 8>