**3GPP TSG-RAN WG4 Meeting # 112-bis *R4-241xxxx***

**Hefei, CN, 14 – 18 October, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **draftCR** | **rev** | **1** | **Current version:** | **18.7.0** |  |
|  | | | | | | | | |
| *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:*** | draftCR on performance requirements for RedCap positioning | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh2-Perf | | | | |  | ***Date:*** | | | 2024-10-18 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | * To define accuracy requirements. * To make corrections to test cases endorsed in RAN4#112. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * []s around accuracy requirements for RedCap positioning endorsed in RAN4#112 are removed. * Corrections to test cases endorsed in RAN4#112 are done. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The performance part, including accuracy requirements and test cases, is not complete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | Existing clause: 3.3  New clauses: 10.1A.16, 10.1A.17, 10.1A.19, A.3.31, A.16.6.6, A.16.6.7, A.16.6.8, A.16.6.9, A.16.7.6, A.16.7.7, A.16.7.8, A.16.7.9, A.16.7.10, A.16.8.1, A.16.8.2, A.16.8.3, A.16.8.4, A.16.9.1, A.16.9.2, A.16.9.3, A.16.9.4, A.16.10.1, A.16.10.2, A.16.11.1, A.16.11.2, A.17.6.1, A.17.6.2, A.17.6.3, A.17.6.4, A.17.6.5, A.17.6.6, A.17.6.7, A.17.6.8, A.17.7.1, A.17.7.2, A.17.7.3, A.17.7.4, A.17.7.5, A.17.7.6, A.17.7.7, A.17.7.8, A.17.8.1, A.17.8.2, A.17.8.3, A.17.8.4, A.17.9.1, A.17.9.2, A.17.9.3, A.17.9.4, A.17.10.1, A.17.10.2, A.17.11.1, A.17.11.2. | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | Changes are based on updated version of big draftCR endorsed in RAN4#112. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2416324 | | | | | | | | |

## **--- Start of Change # 1 ---**

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [11] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [11].

AoA Angle of Arrival

AoD Angle of Departure

ATG Air to Ground

BFD Beam Failure Detection

BFD-RS BFD Reference Signal

BLER Block Error Rate

BM-RS Beam Management Reference Signal

BWP Bandwidth Part

CA Carrier Aggregation

CBD Candidate Beam Detection

CBW Channel Bandwidth

CC Component Carrier

CCA Clear Channel Assessment

CG-SDT Configured Grant Small Data Transmisison

CLI Cross Link Interference

CMR Channel Measurement Resource

CORESET Control Resource Set

CP Cyclic Prefix

CSI Channel-State Information

CSI-RS CSI Reference Signal

CSI-RSRP CSI Reference Signal based Reference Signal Received Power

CSI-RSRQ CSI Reference Signal based Reference Signal Received Quality

CSI-SINR CSI Reference Signal based Signal to Noise and Interference Ratio

CSI\_RP Received (linear) average power of the resource elements that carry NR CSI-RS signals and channels, measured at the UE antenna connector

DBT Discovery Burst Transmission

DC Dual Connectivity

DCI Downlink Control Information

DL Downlink

DL-AoD Downlink Angle-of-Departure

DL-TDOA Downlink Time Difference Of Arrival

DMRS Demodulation Reference Signal

DRX Discontinuous Reception

E-CID Enhanced Cell ID

eDRX Extended DRX

E-UTRA Evolved UTRA

E-UTRAN Evolved UTRAN

EMW Effective measurement window

EMWRP Effective measurement window repetition period

EN-DC E-UTRA-NR Dual Connectivity

FDD Frequency Division Duplex

FH Frequency Hopping

FR Frequency Range

GEO Geostationary Earth Orbit

HARQ Hybrid Automatic Repeat Request

HO Handover

GAP Refers to any of Measurement Gap, activated Pre-MG and NCSG

IMR Interference Measurement Resource

L1-RSRP Layer 1 RSRP

L1 SL-RSRP Layer 1 Sidelink RSRP which corresponds to PSCCH-RSRP and/or PSSCH-RSRP

LEO Low Earth Orbit

LMF Location Management Function

LPP LTE Positioning Protocol

LTM L1/L2 triggered mobility

MAC Medium Access Control

MCG Master Cell Group

MDT Minimization of Drive Tests

MG Measurement Gap

MGL Measurement Gap Length

MGRP Measurement Gap Repetition Period

MIB Master Information Block

ML Measurement Length

MN Master Node

MR-DC Multi-Radio Dual Connectivity

MUSIM Multi-Universal Subscriber Identity Module

NCSG Network Controlled Small Gap

NE-DC NR-E-UTRA Dual Connectivity

NGEN-DC NG-RAN E-UTRA-NR Dual Connectivity

NR New Radio

NR-DC NR-NR Dual Connectivity

NTN Non-Terrestrial Network

OFDM Orthogonal Frequency Division Multiplexing

OFDMA Orthogonal Frequency Division Multiple Access

OTDOA Observed Time Difference Of Arrival

PBCH Physical Broadcast Channel

PCC Primary Component Carrier

PCell Primary Cell

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

PLMN Public Land Mobile Network

PRACH Physical RACH

Pre-MG Pre-configured Measurement Gap

ProSe Proximity-based Service

PRP PRS Received Power

PRS Positioning Reference Signal

PRS-RSRP Positioning Reference Signal based Reference Signal Received Power

PPW PRS Processing Window

PSBCH Physical Sidelink Broadcast Channel

PSBCH-RSRP Physical Sidelink Broadcast Channel DMRS based Reference Signal Received Power

PSCCH Physical Sidelink Control Channel

PSCCH-RSRP Physical Sidelink Control Channel DMRS based Reference Signal Received Power

PSCell Primary SCell

PSS Primary Synchronization Signal

PSSCH Physical Sidelink Shared Channel

PSSCH-RSRP Physical Sidelink Shared Channel DMRS based Reference Signal Received Power

pTAG Primary Timing Advance Group

PTW Paging Time Window

PUCCH Physical Uplink Control Channel

PUSCH Physical Uplink Shared Channel

QCL Quasi Co-Location

RACH Random Access Channel

RAT Radio Access Technology

RF Radio Frequency

RLM Radio Link Monitoring

RLM-RS Reference Signal for RLM

RMSI Remaining Minimum System Information

RRC Radio Resource Control

RRH Remote Radio Head

RRM Radio Resource Management

RRT RF Retuning Time

RSCP Reference Signal Carrier Phase

RSCPD Reference Signal Carrier Phase Difference

RSSI Received Signal Strength Indicator

RSRP Reference Signal Received Power

RSRPP Reference Signal Received Path Power

RSRQ Reference Signal Received Quality

RSTD Reference Signal Time Difference

RTOA Relative Time Of Arrival

RTT Round Trip Time

S-SSB Sidelink Synchronization Signal Block

SSB\_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels, measured at the UE antenna connector or radiated interface boundary.

SA Standalone operation mode

SAB Satellite access band

SAN Satellite Access Node

SCC Secondary Component Carrier

SCCH Sidelink Control Channel

SCell Secondary Cell

SCG Secondary Cell Group

SCS Subcarrier Spacing

SCSSSB SSB subcarrier spacing

SDL Supplementary Downlink

SDT Small Data Transmission

SFN System Frame Number

SFTD SFN and Frame Timing DifferenceSI System Information

SIB System Information Block

SL Sidelink

SL AoA Sidelink AoA

SL PRS-RSRP Sidelink PRS-based RSRP

SL PRS-RSRPP Sidelink PRS-based RSRPP

SL RSTD Sidelink RSTD

SL RTOA Sidelink RTOA

SL Rx-Tx Sidelink Receive-Transmit time difference

SL-PRP SL-PRS Received Power

SL-PRS Sidelink PRS

SL-RSSI Sidelink Received Signal Strength Indicator

SLPP Sidelink Positioning Protocol

SLSS Sidelink Synchronization Signal

SMTC SSB-based Measurement Timing configuration

SpCell Special Cell

SRS Sounding Reference Signal

SRS-RSRP Sounding Reference Signal based Reference Signal Received Power

SS-RSRP Synchronization Signal based Reference Signal Received Power

SS-RSRQ Synchronization Signal based Reference Signal Received Quality

SS-SINR Synchronization Signal based Signal to Noise and Interference Ratio

SSB Synchronization Signal Block

SSB\_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels, measured at the UE antenna connector.

SSS Secondary Synchronization Signal

sTAG Secondary Timing Advance Group

SUL Supplementary Uplink

TA Timing Advance

TAG Timing Advance Group

TCI Transmission Configuration Indicator

TDD Time Division Duplex

TDOA Time Difference Of Arrival

TN Terrestrial Network

TRP Transmission-Reception Point

TTI Transmission Time Interval

U2N UE-to-Network

U2U UE-to-UE

UE User Equipment

UL Uplink

V2X Vehicle-to-Everything service

VIL Visible Interruption Length

VIRP Visible Interruption Repetition Period

VSAT Very Small Aperture Terminal

## **--- End of Change # 1 ---**

## **--- Start of Change # 2 ---**

### 10.1A.16 RSTD Measurements for RedCap Positioning

#### 10.1A.16.1 Introduction

The requirements in Clause 10.1A.16 shall apply, provided the UE has received *nr-DL-TDOA-RequestLocationInformation* message from LMF via LPP [34] requesting the UE to report one or more DL RSTD measurements defined in TS 38.215 [4].

The requirements in Clause 10.1A.16 shall apply,

* When the RedCap UE is in RRC\_CONNECTED state and the RSTD measurement is performed with and without RX FH within measurement gap.
* When RedCap UE is in RRC\_CONNECTED state and the RSTD measurement is performed without RX FH outside of the measurement gap.
* When RedCap UE is in RRC\_CONNECTED state and the RSTD measurement is performed without RX FH when both PPW and measurement gap is configured.
* When RedCap UE is in RRC\_INACTIVE state and the RSTD measurement is performed with and without RX FH.
* When RedCap UE is in RRC\_IDLE state and the RSTD measurement is performed with and without RX FH.

The requirements defined in Clause 10.1A.16 are valid under the conditions defined in 10.1.23.

#### 10.1A.16.2 Measurement Accuracy Requirements

The accuracy requirements for RSTD measurement shall be within ±(X+Y+Z+Δ) Tc. The values of Y, Z and Δ and Rx TEG based requirement are as defined in Clause 10.1.23.2. For Rx FH, PRS BW in Table 10.1.23.2-5, Table 10.1.23.2-5a, Table 10.1.23.2-6, Table 10.1.23.2-6a refer to per hop BW. The requirements for fading channel in this clause are derived based on TDL-A (30 ns delay spread, 5Hz) and TDL-C (60 ns delay spread, 300 Hz) channel models for FR1 and FR2, respectively.

##### 10.1A.16.2.1 Accuracy requirement for RSTD measurement without RX FH

For 4 sample RSTD measurement performed by 2Rx RedCap UE without RX FH, the values of X, corresponding to the PRS bandwidth supported by the RedCap UE for PRS measurement without RX FH, in Tables 10.1.23.2-1 in FR1 for AWGN, 10.1.23.2-2 in FR2 for AWGN, 10.1.23.2-3 in FR1 for fading channel, and 10.1.23.2-4 in FR2 for fading channel apply.

For reduced sample RSTD measurement performed by 2Rx RedCap UE without RX FH, the values of X, corresponding to the PRS bandwidth supported by the RedCap UE for PRS measurement without RX FH, in Tables 10.1.23.2-7 in FR1 for AWGN, and 10.1.23.2-8 in FR2 for AWGN apply.

The value of X for 4 sample RSTD measurement performed by 1Rx RedCap UE without RX FH is defined in Table 10.1A.16.2.1-1 in FR1 for AWGN, and in Table 10.1A.16.2.1-2 in FR1 for fading channel.

The value of X for reduced sample RSTD measurement performed by 1Rx RedCap UE without RX FH is defined in Table 10.1A.16.2.1-3 in FR1 for AWGN.

Table 10.1A.16.2.1-1: RSTD absolute accuracy for 1Rx RedCap UE in FR1 for AWGN channel (without RX FH)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| [137] | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 15 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| NR\_FDD\_FR1\_N | -120.5 | -50 |
| [79] | ≥ 52 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [45] | ≥ 104 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [81] | 30 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| NR\_FDD\_FR1\_N | -117.5 | -50 |
| [46] | 30 | ≥ 48 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [52] | 60 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -114.5 | -50 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS. | | | | | | | |

Table 10.1A.16.2.1-2: RSTD absolute accuracy for 1Rx RedCap UE in FR1 for fading channel (without RX FH)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| [191] | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-10dB | 15 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| NR\_FDD\_FR1\_N | -120.5 | -50 |
| [146] | ≥ 52 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [100] | ≥ 104 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [129] | 30 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| NR\_FDD\_FR1\_N | -117.5 | -50 |
| [110] | ≥ 48 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [96] | 60 | ≥ 24 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -114.5 | -50 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS. | | | | | | | |

Table 10.1A.16.2.1-3: RSTD absolute accuracy for 1Rx RedCap UE in FR1 for AWGN channel with reduced number of samples (without RX FH)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB |  |  | dBm/SCS | dBm/BWChannel |
| [109] | (PRS Ês/Iot)ref ≥-3dB  (PRS Ês/Iot)*i* ≥-6dB | 15 | ≥ 52 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| NR\_FDD\_FR1\_N | -120.5 | -50 |
| [60] | ≥ 104 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [62] | 30 | ≥ 48 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| NR\_FDD\_FR1\_N | -117.5 | -50 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS. | | | | | | | |

##### 10.1A.16.2.2 Accuracy requirement for RSTD measurement with RX FH

The value of X for 4 sample RSTD measurement performed by 2Rx RedCap UE with RX FH is defined in Tables 10.1A.16.2.2-1 in FR1 for AWGN, 10.1A.16.2.2-2 in FR2 for AWGN, 10.1A.16.2.2-3 in FR1 for fading channel, and 10.1.23.2-4 in FR2 for fading channel, respectively.

The value of X for reduced sample RSTD measurement performed by 2Rx RedCap UE with RX FH is defined in Tables 10.1A.16.2.2-5 in FR1 for AWGN, and 10.1A.16.2.2-6 in FR2 for AWGN, respectively.

The value of for 4 sample RSTD measurement performed by 1Rx RedCap UE with RX FH is defined in Tables 10.1A.16.2.2-7 in FR1 for AWGN, and 10.1A.16.2.2-8 in FR1 for fading channel, respectively.

The value of for reduced sample RSTD measurement performed by 1Rx RedCap UE with RX FH is defined in Table 10.1A.16.2.2-9 in FR1 for AWGN.

Table 10.1A.16.2.2-1: RSTD absolute accuracy for 2Rx RedCap UE in FR1 for AWGN channel (with RX FH)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth per hop  Note 1 | Total PRS bandwidth after all hopsNote 7 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB | RB |  |  | dBm/SCS | dBm/BWChannel |
| [50] | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 15 | ≥ 52 | 268 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [26] | 30 | 48 | 272 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [27] | 60 | 24 | 132 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -114.5 | -50 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Total PRS bandwidth after all hops regardless of the size of the overlapping bandwidth between hops. | | | | | | | | |

Table 10.1A.16.2.2-2: RSTD absolute accuracy for 2Rx RedCap UE in FR2 for AWGN channel (with RX FH)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth per hop  Note 1 | Total PRS bandwidth after all hopsNote 6 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| Tc Note 4 | dB | kHz | RB | RB |  | dBm/SCS | dBm/BWChannel |
| [15] | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 60 | ≥ 64 | 264 | ≥ 1 | Note 5 | Note 5 |
| [8] | 120 | 64 | 264 | ≥ 1 | Note 5 | Note 5 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: Total PRS bandwidth after all hops regardless of the size of the overlapping bandwidth between hops. | | | | | | | |

Table 10.1A.16.2.2-3: RSTD absolute accuracy for 2Rx RedCap UE in FR1 for fading channel (with RX FH)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth per hop  Note 1 | Total PRS bandwidth after all hopsNote 7 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB | RB |  |  | dBm/SCS | dBm/BWChannel |
| [36] | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 15 | ≥ 52 | 268 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [22] | 30 | 48 | 272 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [29] | 60 | 24 | 132 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -114.5 | -50 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Total PRS bandwidth after all hops regardless of the size of the overlapping bandwidth between hops. | | | | | | | | |

Table 10.1A.16.2.2-4: RSTD absolute accuracy for 2Rx RedCap UE in FR2 for fading channel (with RX FH)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth per hop  Note 1 | Total PRS bandwidth after all hopsNote 6 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| Tc Note 4 | dB | kHz | RB | RB |  | dBm/SCS | dBm/BWChannel |
| [37] | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 60 | ≥ 64 | 264 | ≥ 1 | Note 5 | Note 5 |
| [37] | 120 | 64 | 264 | ≥ 1 | Note 5 | Note 5 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: Total PRS bandwidth after all hops regardless of the size of the overlapping bandwidth between hops. | | | | | | | |

Table 10.1A.16.2.2-5: RSTD absolute accuracy for 2Rx RedCap UE in FR1 for AWGN channel with reduced number of samples (with RX FH)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | Total PRS bandwidth after all hopsNote 7 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB | RB |  |  | dBm/SCS | dBm/BWChannel |
| [33] | (PRS Ês/Iot)ref ≥-3dB  (PRS Ês/Iot)*i* ≥-6dB | 15 | ≥ 52 | 268 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| NR\_FDD\_FR1\_N | -120.5 | -50 |
| [18] | 30 | 48 | 272 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| NR\_FDD\_FR1\_N | -117.5 | -50 |
| [21] | 60 | 24 | 132 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -114.5 | -50 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Total PRS bandwidth after all hops regardless of the size of the overlapping bandwidth between hops. | | | | | | | | |

Table 10.1A.16.2.2-6: RSTD absolute accuracy for 2Rx RedCap UE in FR2 for AWGN channel with reduced number of samples (with RX FH)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth  Note 1 | Total PRS bandwidth after all hopsNote 6 | PRS resource repetition  () Note 2 | Io Note 3 range | |
| Minimum Io | Maximum Io |
| Tc Note 4 | dB | kHz | RB | RB |  | dBm/SCS | dBm/BWChannel |
| [12] | (PRS Ês/Iot)ref ≥-3dB  (PRS Ês/Iot)*i* ≥-6dB | 60 | ≥ 64 | [264] | ≥ 1 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | Note 5 |
| [6] | 120 | 64 | 264 | ≥ 1 | Same value as PRS\_RP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | Note 5 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 5: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 6: Total PRS bandwidth after all hops regardless of the size of the overlapping bandwidth between hops. | | | | | | | |

Table 10.1A.16.2.2-7: RSTD absolute accuracy for 1Rx RedCap UE in FR1 for AWGN channel (with RX FH)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth per hop  Note 1 | Total PRS bandwidth after all hopsNote 7 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB | RB |  |  | dBm/SCS | dBm/BWChannel |
| [58] | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 15 | ≥ 52 | 268 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [30] | 30 | 48 | 272 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| NR\_FDD\_FR1\_N | -117.5 | -50 |
| [27] | 60 | ≥24 | 132 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -114.5 | -50 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Total PRS bandwidth after all hops regardless of the size of the overlapping bandwidth between hops. | | | | | | | | |

Table 10.1A.16.2.2-8: RSTD absolute accuracy for 1Rx RedCap UE in FR1 for fading channel (with RX FH)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth per hop  Note 1 | Total PRS bandwidth after all hopsNote 7 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB | MHz |  |  | dBm/SCS | dBm/BWChannel |
| [72] | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-10dB | 15 | ≥ 52 | 268 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [59] | 30 | 48 | 272 | ≥ 1 | Note 6 | Note 6 | Note 6 |
| [31] | 60 | 24 | 132 | ≥ 4 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -114.5 | -50 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Total PRS bandwidth after all hops regardless of the size of the overlapping bandwidth between hops. | | | | | | | | |

Table 10.1A.16.2.2-9: RSTD absolute accuracy for 1Rx RedCap UE in FR1 for AWGN channel with reduced number of samples (with RX FH)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | Conditions | | | | | | | |
| PRS Ês/Iot | PRS SCS | PRS bandwidth per hop  Note 1 | Total PRS bandwidth after all hopsNote 7 | PRS resource repetition ()  Note 2 | Io Note 3 range | | |
| NR operating band groups Note 4 | Minimum Io | Maximum Io |
| Tc Note 5 | dB | kHz | RB | MHz |  |  | dBm/SCS | dBm/BWChannel |
| [42] | (PRS Ês/Iot)ref ≥-3dB  (PRS Ês/Iot)*i* ≥-6dB | 15 | ≥ 52 | 268 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -50 |
| NR\_FDD\_FR1\_N | -120.5 | -50 |
| [21] | 30 | 48 | 272 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -124 | -50 |
| NR\_FDD\_FR1\_B | -123.5 | -50 |
| NR\_TDD\_FR1\_C | -123 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -50 |
| NR\_FDD\_FR1\_F | -121.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -121 | -50 |
| NR\_FDD\_FR1\_H | -120.5 | -50 |
| NR\_FDD\_FR1\_N | -117.5 | -50 |
| [24] | 60 | 24 | 132 | ≥ 1 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
| NR\_FDD\_FR1\_B | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 | -50 |
| NR\_FDD\_FR1\_F | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -114.5 | -50 |
| NOTE 1: Minimum PRS bandwidth, which is minimum of the PRS bandwidths of the reference resource and the measured neighbour resource i.  NOTE 2: Minimum number of PRS resource repetitions among the reference resource and the measured neighbour resource i. are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN* defined in TS 37.355 [34], respectively.  NOTE 3: Io is assumed to have constant EPRE across the bandwidth.  NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.  NOTE 5: Tc is the basic timing unit defined in TS 38.211 [6].  NOTE 6: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth of the smallest RB number for the corresponding SCS.  NOTE 7: Total PRS bandwidth after all hops regardless of the size of the overlapping bandwidth between hops. | | | | | | | | |

#### 10.1A.16.3 Report Mapping

##### 10.1A.16.3.1 Absolute DL RSTD Measurement Reporting

Measurement reporting range and report mapping tables defined in Clause 10.1.23.3.1 apply to DL RSTD measurement reporting for both 1Rx and 2Rx RedCap UEs and DL RSTD measurement performed with and without RX FH.

##### 10.1A.16.3.2 Differential Reporting for DL RSTD Measurement

Measurement reporting range and report mapping tables defined in Clause 10.1.23.3.2 apply to DL RSTD measurement reporting for both 1Rx and 2Rx RedCap UEs and DL RSTD measurement performed with and without RX FH.

##### 10.1A.16.3.3 Additional Path Report Mapping for DL RSTD

Measurement reporting range and report mapping tables defined in Clause 10.1.23.3.3 apply to DL RSTD measurement reporting for both 1Rx and 2Rx RedCap UEs and DL RSTD measurement performed with and without RX FH.

## **--- End of Change # 2 ---**

## **--- Start of Change # 3 ---**

### 10.1A.17 PRS-RSRP Measurements for RedCap positioning

#### 10.1A.17.1 Introduction

The requirements in Clause 10.1A.17 shall apply, provided the UE has received *nr-DL-TDOA-RequestLocationInformation* or *nr-Multi-RTT-RequestLocationInformation* or *nr-DL-AoD-RequestLocationInformation* message from LMF via LPP [34] requesting the UE to report one or more DL PRS-RSRP measurements defined in TS 38.215 [4].

The requirements in Clause 10.1A.17 shall apply,

* When the RedCap UE is in RRC\_CONNECTED state and the PRS-RSRP measurement is performed with and without RX FH within measurement gap.
* When RedCap UE is in RRC\_CONNECTED state and the PRS-RSRP measurement is performed without RX FH outside of the measurement gap.
* When RedCap UE is in RRC\_CONNECTED state and the PRS-RSRP measurement is performed without RX FH when both PPW and measurement gap is configured.
* When RedCap UE is in RRC\_INACTIVE state and the PRS-RSRP measurement is performed with and without RX FH.
* When RedCap UE is in RRC\_IDLE state and the PRS-RSRP measurement is performed with and without RX FH.

The requirements defined in Clause 10.1A.17 are valid under the conditions defined in Clause 10.1.24.1.

#### 10.1A.17.2 Measurement Accuracy Requirements

##### 10.1A.17.2.1 Absolute PRS RSRP Accuracy Requirement

Accuracy requirement, corresponding to the PRS bandwidth supported by the RedCap UE for measurement without RX FH, defined in Clause 10.1.24.2.1 apply to the PRS-RSRP measurement performed by 2Rx RedCap UE without RX FH.

Accuracy requirement in Clause 10.1.24.2.1 apply to the PRS-RSRP measurement performed by 2Rx RedCap UE with RX FH, where the PRS bandwidth in Clause 10.1.24.2.1 correspond to the PRS bandwidth measured by the RedCap UE per hop.

Accuracy requirement in Table 10.1A.17.2.1-1 applies to the 4-sample PRS-RSRP measurement performed by 1Rx RedCap UE without RX FH.

Accuracy requirement in Table 10.1A.17.2.1-2 applies to reduced sample PRS-RSRP measurement performed by 1Rx RedCap UE without RX FH

Accuracy requirement in Table 10.1A.17.2.1-1 and Table 10.1A.17.2.1-2 apply to the PRS-RSRP measurement performed by 1Rx RedCap UE with RX FH, where the PRS bandwidth in Table 10.1A.17.2.1-1 and Table 10.1A.17.2.1-2 correspond to the PRS bandwidth measured by the RedCap UE per hop.

Table 10.1A.17.2.1-1: PRS-RSRP absolute accuracy for 1Rx RedCap UE in FR1 (without RX FH)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BWNote 2 | Repetition factor  ( | Io Note 5 range | | | | |
| NR operating band groups Note 6 | Minimum Io Note 1  dBm / SCSPRS | | | Maximum Io |
| dB | dB | dB | PRB |  |  | dBm / SCSPRS | | | dBm/BWChannel |
| dBm/15kHz Note 4 | dBm/30kHz Note 4 | dBm/60kHz Note 4 |
| [±7] | [±11.5] | ≥-3dB | ≥24 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -120.5 | -117.5 | -114.5 | -50 |
| [±6.5] | [±11] | ≥-10dB | 24 ≤ BW ≤ 52 | All | Note 3 | | | | |
| [±5.5] | [±10] | 52< BW≤ 104 | All | Note 3 | | | | |
| [±4] | [±8.5] | BW >104 | All | Note 3 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *dl-PRS-ResourceBandwidth* in the DL-TDOA or DL-AoD or multi-RTT assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 4: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 5: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 6: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

Table 10.1A.17.2.1-2: PRS-RSRP absolute accuracy for 1Rx RedCap UE in FR1 with reduced sample number (without RX FH)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | | |
| **Normal condition** | **Extreme condition** | **PRS Ês/Iot** | **PRS BWNote 2** | **Repetition factor**  **(** | **Io Note 6 range** | | | | |
| **NR operating band groups Note 5** | **Minimum Io Note 1**  **dBm / SCSPRS** | | | **Maximum Io** |
| **dB** | **dB** | **dB** | **PRB** |  |  | **dBm / SCSPRS** | | | **dBm/BWChannel** |
| **dBm/15kHz Note 4** | **dBm/30kHz Note 4** | **dBm/60kHz Note 4** |
| ±4 | ±8.5 | ≥0 | ≥48 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_N | -120.5 | -117.5 | -114.5 | -50 |
| ±3.5 | ±8 | ≥-6 | 48 ≤ BW ≤ 52 | All | Note 3 | | | | |
| ±3.5 | ±8 | 52< BW≤ 104 | All | Note 3 | | | | |
| ±3 | ±7.5 | BW >104 | All | Note 3 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *dl-PRS-ResourceBandwidth* in the DL-TDOA or DL-AoD or multi-RTT assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 48 RB.  NOTE 4: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 5: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

##### 10.1A.17.2.2 Relative PRS RSRP Accuracy Requirement

Relative accuracy requirement, corresponding to the PRS bandwidth supported by the RedCap UE for measurement without RX FH, defined in Clause 10.1.24.2.2 apply to the PRS-RSRP measurement performed by 2Rx RedCap UE without RX FH.

Relative accuracy requirement in Clause 10.1.24.2.2 apply to the PRS-RSRP measurement performed by 2Rx RedCap UE with RX FH, where the PRS bandwidth in Clause 10.1.24.2.2 correspond to the PRS bandwidth measured by the RedCap UE per hop.

Relative accuracy requirement in Table 10.1A.17.2.2-1 applies to the 4-sample PRS-RSRP measurement performed by 1Rx RedCap UE without RX FH.

Relative accuracy requirement in Table 10.1A.17.2.2-2 applies to reduced sample PRS-RSRP measurement performed by 1Rx RedCap UE without RX FH.

Relative accuracy requirement in Table 10.1A.17.2.2-1 and Table 10.1A.17.2.2-2 apply to the PRS-RSRP measurement performed by 1Rx RedCap UE with RX FH, where the PRS bandwidth in Table 10.1A.17.2.1-1 and Table 10.1A.17.2.1-2 correspond to the PRS bandwidth measured by the RedCap UE per hop.

Table 10.1A.17.2.2-1: PRS-RSRP relative accuracy for 1Rx RedCap UE in FR1 (without RX FH)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BWNote 2 | Repetition factor  ( | Io Note 5 range | | | | |
| NR operating band groups Note 6 | Minimum Io Note 1  dBm / SCSPRS | | | Maximum Io |
| dB | dB | dB | PRB |  |  | dBm / SCSPRS | | | dBm/BWChannel |
| dBm/15kHz Note 4 | dBm/30kHz Note 4 | dBm/60kHz Note 4 |
| ±4 | ±8.5 | ≥-3dB | ≥24 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -120.5 | -117.5 | -114.5 | -50 |
| ±5.5 | ±10 | ≥-10dB | 24 ≤ BW ≤ 52 | All | Note 3 | | | | |
| ±5 | ±9.5 | 52< BW≤ 104 | All | Note 3 | | | | |
| ±4 | ±4.5 | BW >104 | All | Note 3 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *dl-PRS-ResourceBandwidth* in the DL-TDOA or DL-AoD or multi-RTT assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 4: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 5: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 6: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

Table 10.1A.17.2.2-2: PRS-RSRP relative accuracy for 1Rx RedCap UE in FR1 with reduced sample number (without RX FH)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | | **Conditions** | | | | | | | |
| **Normal condition** | **Extreme condition** | **PRS Ês/Iot** | **PRS BWNote 2** | **Repetition factor**  **(** | **Io Note 5 range** | | | | |
| **NR operating band groups Note 6** | **Minimum Io Note 1**  **dBm / SCSPRS** | | | **Maximum Io** |
| **dB** | **dB** | **dB** | **PRB** | **-** |  | **dBm / SCSPRS** | | | **dBm/BWChannel** |
| **dBm/15kHz Note 4** | **dBm/30kHz Note 4** | **dBm/60kHz Note 4** |
| ±4 | ±8.5 | ≥0 | ≥48 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G, NR\_TDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_N | -120.5 | -117.5 | -114.5 | -50 |
| ±3.5 | ±8 | ≥-6 | 48 ≤ BW ≤ 52 | All | Note 3 | | | | |
| ±3.5 | ±8 | 52< BW≤ 104 | All | Note 3 | | | | |
| ±3 | ±7.5 | BW >104 | All | Note 3 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *dl-PRS-ResourceBandwidth* in the DL-TDOA or DL-AoD or multi-RTT assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 48 RB.  NOTE 4: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 5: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 6: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

#### 10.1A.17.3 Report Mapping

##### 10.1A.17.3.1 Absolute PRS-RSRP Measurement Report Mapping

Measurement reporting range and report mapping tables defined in Clause 10.1.24.3.1 apply to PRS-RSRP measurement reporting for both 1Rx and 2Rx RedCap UEs and PRS-RSRP measurement performed with and without RX FH.

##### 10.1A.17.3.2 Differential Report Mapping for PRS-RSRP Measurement

Measurement reporting range and report mapping tables defined in Clause 10.1.24.3.2 apply to PRS-RSRP measurement reporting for both 1Rx and 2Rx RedCap UEs and PRS-RSRP measurement performed with and without RX FH.

## **--- End of Change # 3 ---**

## **--- Start of Change # 4 ---**

### 10.1A.19 PRS-RSRPP Measurements for RedCap Positioning

#### 10.1A.19.1 Introduction

The requirements in Clause 10.1A.19.2 shall apply, provided the RedCap UE has received *nr-DL-AoD-RequestLocationInformation* message from LMF via LPP [34] requesting the RedCap UE to report one or more DL PRS-RSRPP measurements defined in TS 38.215 [4]. The requirements in Clause 10.1A.19 shall apply:

- when RedCap UE is in RRC\_CONNECTED state,

- when RedCap UE is in RRC\_INACTIVE state,

- when RedCap UE is in RRC\_IDLE state.

The requirements in Clause 10.1A.19.2 apply for the first path PRS-RSRP measurement.

#### 10.1A.19.2 Measurement Accuracy Requirements

##### 10.1A.19.2.1 Absolute PRS RSRPP accuracy

The absolute accuracy requirements for PRS-RSRPP measurements for 1Rx RedCap UE for FR1 defined in Table 10.1A.19.2.1-1 and Table 10.1A.19.2.1-2 are valid under the following conditions:

- Conditions defined in 38.101-1 Clause 7.3 for reference sensitivity are fulfilled.

- PRP 1,2|dBm according to Annex B.2.14 for a corresponding Band.

The absolute accuracy requirements for PRS-RSRPP measurements defined in clause 10.1.38.2.1 are reused for 2Rx RedCap UE.

The absolute accuracy requirements for PRS-RSRPP measurement defined in Table 10.1A.19.2.1-1 apply for the RedCap UE not supporting *supportedDL-PRS-ProcessingSamples* [34] or LMF does not indicate RedCap UE to perform positioning measurements with reduced number of samples.

The absolute accuracy requirements for PRS-RSRPP measurement defined in Table 10.1A.19.2.1-2 apply for the RedCap UE supporting *supportedDL-PRS-ProcessingSamples* [34].

The absolute accuracy requirements for PRS-RSRPP measurement defined in this clause apply to the measurements with and without frequency hopping. For the measurements with frequency hopping, the accuracy requirements apply for the corresponding PRS bandwidth per hop.

Note: The requriements in this clause are derived based on two-tap channel defined in 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz).

Note: The requirements in this clause are derived based on the difference between the estimated PRS-RSRPP compared to the ideal PRS-RSRPP defined as

Where:

is the effective channel frequency response (over REs occupied by PRS) measured without receiver noise.

is the exact delay of the p-th path in the channel model.

Table 10.1A.19.2.1-1: PRS-RSRPP absolute accuracy for 1Rx RedCap UE for FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| **Normal condition** | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | **Io Note 6 range** | | | | |
| NR operating band groups Note 7 | Minimum Io Note 1  dBm / SCSPRS | | | Maximum Io |
| **dB** | **dB** | **dB** | **PRB** | **-** |  | dBm / SCSPRS | | | dBm/BWChannel |
| dBm/15kHz Note 6 | dBm/30kHz Note 6 | dBm/60kHz Note 6 |
| [±3.5] | [±8] | ≥-3 | ≥24 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -120.5 | -117.5 | -114.5 | -50 |
| Note 3 | | | | |
| Note 3 | | | | |
| [±4.5] | [±9] | ≥-10 | 24 ≤ BW ≤ 52 | All | Note 3 | | | | |
| [±3.5] | [±8] | BW > 52 | All | Note 3 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *prs-Bandwidth* in the DL-TDOA or DL-AoD assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 24 RB.  NOTE 4: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 5: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 7: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

Table 10.1A.19.2.1-2: PRS-RSRPP absolute accuracy for 1Rx RedCap UE for FR1

for reduced number of samples

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | | | |
| Normal condition | Extreme condition | PRS Ês/Iot | PRS BW | Repetition factor  ( | Io Note 6 range | | | | |
| NR operating band groups Note 7 | Minimum Io Note 1  dBm / SCSPRS | | | Maximum Io |
| dB | dB | dB | PRB | - |  | dBm / SCSPRS | | | dBm/BWChannel |
| dBm/15kHz Note 6 | dBm/30kHz Note 6 | dBm/60kHz Note 6 |
| [±3.5] | [±8] | ≥0 | ≥48 | All | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | -121 | -50 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 | -120.5 | -50 |
| NR\_TDD\_FR1\_C | -126 | -123 | -120 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 | -119.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 | -119 | -50 |
| NR\_FDD\_FR1\_F | -124.5 | -121.5 | -118.5 | -50 |
| NR\_FDD\_FR1\_G | -124 | -121 | -118 | -50 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 | -117.5 | -50 |
| NR\_FDD\_FR1\_N | -120.5 | -117.5 | -114.5 | -50 |
| Note 3 | | | | |
| Note 3 | | | | |
| [±4] | [±8.5] | ≥-6 | 48 ≤ BW ≤ 52 | All | Note 3 | | | | |
| [±3.5] | [±7.5] | BW >52 | All | Note 3 | | | | |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: PRS bandwidth is as indicated in *prs-Bandwidth* in the DL-TDOA or DL-AoD assistance data defined in [34].  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 48 RB.  NOTE 4: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.  NOTE 5: The condition level is increased by ∆>0, when applicable, as described in Sections B.3.2 and B.3.3.  NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.  NOTE 7: NR operating band groups are as defined in Section 3.5.2. | | | | | | | | | |

#### 10.1A.19.3 Report mapping

##### 10.1A.19.3.1 Absolute PRS-RSRPP Measurement Report Mapping

The absolute PRS-RSRPP measurement report mapping defined in clause 10.1.38.3.1 applies.

##### 10.1A.19.3.2 Differential Report Mapping for PRS-RSRPP Measurement

The differential report mapping for PRS-RSRPP measurement defined in clause 10.1.38.3.2 applies.

## **--- End of Change # 4 ---**

## **--- Start of Change # 5 ---**

#### A.3.31.1.1. PRS pattern 1 in FR1: SCS=15 kHz

Table A.3.31.1.1-1: PRS.1 FR1: PRS Pattern 1 for SCS=15 kHz

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| PRS Parameters | Values | | | | | | |
| Reference channel | PRS.1.1 FR1 | PRS.1.2 FR1 | PRS.1.3 FR1 | | PRS.1.4 FR1 | | PRS.1.5 FR1 |
| Resource index in resource set | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| PRS periodicity | 160ms | | | | | | |
| PRS Resource set slot offset Note 1 | 10 ms | | | | | | |
| PRS Resource slot offset (slot) Note 1 | 0 | 4 | 0 | | 4 | | 4 |
| PRS RE offset Note 1 | 0 | | 0 | 1 | 0 | 1 | 1 |
| SCS | 15kHz | | | | | | |
| PRS comb size | 2 | 4 | 2 | | 4 | | 4 |
| Number of PRS symbol | 4 | 4 | 4 | | 4 | | 4 |
| Repetion factor | 2 | 1 | 2 | | 1 | | 6 |
| PRS resource time gap (slot) | 1 | 1 | 1 | | 1 | | 1 |
| RB numbers containing PRS within channel BW Note 1 | 0-23 | 0-103 | 0-23 | | 0-103 | | 0-271 |
| PRS Start PRB | 0 | | | | | | |
| Note 1: Unless otherwise specified in the test case | | | | | | | |

#### A.3.31.1.2. PRS pattern 2 in FR1: SCS=30 kHz

Table A.3.31.1.2-1: PRS.2 FR1: PRS Pattern 2 for SCS=30 kHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRS Parameters | Values | | | | | | | |
| Reference channel | PRS.2.1 FR1 | PRS.2.2 FR1 | PRS.2.3 FR1 | | PRS.2.4 FR1 | | PRS.2.5 FR1 | PRS.2.6 FR1 |
| Resource index in resource set | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| PRS periodicity | 160 ms | | | | | | | |
| PRS Resource set slot offset Note 1 | 10 ms | | | | | | | |
| PRS Resource slot offset (slot) Note 1 | 0 | 4 | 0 | | 4 | | 0 | 0 |
| PRS RE offset Note 1 | 0 | | 0 | 1 | 0 | 1 | 0 | 0 |
| SCS | 30 kHz | | | | | | | |
| PRS comb size | 2 | 4 | 2 | | 4 | | 4 | 4 |
| Number of PRS symbol | 4 | 4 | 4 | | 4 | | 4 | 4 |
| Repetion factor | 2 | 1 | 2 | | 1 | | 1 | 6 |
| PRS resource time gap (slot) | 1 | 1 | 1 | | 1 | | 1 | 1 |
| RB numbers containing PRS within channel BW Note 1 | 0-23 | 0-131 | 0-23 | | 0-131 | | 0-47 | 0-271 |
| PRS Start PRB | 0 | | | | | | | |
| Note 1: Unless otherwise specified in the test case. | | | | | | | | |

### A.3.31.2. PRS Configurations for FR2

#### A.3.31.2.1. PRS pattern 1 in FR2: SCS=120 kHz

Table A.3.31.2.1-1: PRS.1 FR2: PRS Pattern 1 for SCS=120 kHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRS Parameters | Values | | | | | | | |
| Reference channel | PRS.1.1 FR2 | PRS.1.2 FR2 | PRS.1.3 FR2 | | PRS.1.4 FR2 | | PRS.1.5 FR2 | PRS.1.6 FR2 |
| Resource index in resource set | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| PRS periodicity | 160 ms | | | | | | | |
| PRS Resource set slot offset Note 1 | 10 ms | | | | | | | |
| PRS Resource slot offset (slot) Note 1 | 0 | 4 | 0 | | 4 | | 0 | 0 |
| PRS RE offset Note 1 | 0 | | 0 | 1 | 0 | 1 | 0 | 0 |
| SCS | 120 kHz | | | | | | | |
| PRS comb size | 2 | 4 | 2 | | 4 | | 4 | 4 |
| Number of PRS symbol | 4 | 4 | 4 | | 4 | | 4 | 4 |
| Repetion factor | 2 | 1 | 2 | | 1 | | 1 | 6 |
| PRS resource time gap (slot) | 1 | 1 | 1 | | 1 | | 1 | 1 |
| RB numbers containing PRS within channel BW Note 1 | 0-31 | 0-127 | 0-31 | | 0-127 | | 0-63 | 0-271 |
| PRS Start PRB | 0 | | | | | | | |
| Note 1: Unless otherwise specified in the test case. | | | | | | | | |

## **--- End of Change # 5 ---**

## **--- Start of Change # 6 ---**

#### A.16.6.6.1 NR RSTD measurement reporting delay test case for RedCap UE without FH in FR1 SA

##### A.16.6.6.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC CONNECTED state meets the requirements specified in Clause 9.9A.2 in an environment with AWGN propagation conditions in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.16.6.6.1.1-1.

Table A.16.6.6.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All 3 cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

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

The *NR-DL-TDOA-ProvideAssistanceData* and *NR-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the RedCap UE during T1. The measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request. The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #0 before T2.

The general test parameters are listed in Table A.16.6.6.1.1-2, and cell specific test parameters are listed in Table A.16.6.6.1.1-3.

Table A.16.6.6.1.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| SSB configuration | Config 1 |  | SSB.1 FR1 |  |
| Config 2 |  | SSB.1 FR1 |
| Config 3 |  | SSB.1 RedCap FR1 |
| Config 4 |  | SSB.1 FR1 |
| SMTC configuration | Config 1 |  | SMTC.2 |  |
| Config 2 |  | SMTC.1 |
| Config 3 |  | SMTC.1 |
| Config 4 |  | SMTC.2 |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| Config 2 |  | SR.1.1 TDD |
| Config 3 |  | SR.2.1 TDD |
| Config 4 |  | SR.1.1 FDD |
| RMSI CORESET RMC configuration | Config 1 |  | CR.1.1 FDD | As specified in clause A.3.1.2 |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Config 4 |  | CR.1.1 FDD |
| Dedicated CORESET RMC configuration | Config 1 |  | CCR.1.1 FDD |  |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| Config 4 |  | CCR.1.1 FDD |
| Initial BWP configuration | Config 1,2,3,4 |  | DLBWP.0.1  ULBWP.0.1 |  |
| Active DL BWP configuration | Config 1,2,3,4 |  | DLBWP.1.1 |  |
| Active UL BWP configuration | Config 1,2,3,4 |  | ULBWP.1.1 |  |
| PRS Configuration | Config 1 |  | PRS.1.1 FR1 | As specified in clause A.3.31 |
| Config 2 |  | PRS.1.1 FR1 |
| Config 3 |  | PRS.2.1 FR1 |
| Config 4 |  | PRS.1.1 FR1 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| Measurement gap | |  | GP#24 or GP#0 | GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance ta specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 4 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [34] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |

Table A.16.6.6.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | N/A | N/A |
| EPRE ratio of PSS to SSS | | dB | 0 | N/A | N/A |
| 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 | |
| Note 3 | Config 1 | dBm/SCS | -98 | | |
| Config 2 | dBm/SCS | -98 | | |
| Config 3 | dBm/SCS | -95 | | |
| Config 4 | dBm/SCS | -98 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| SSB | | dB | 10 | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| Config 2 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| Config 3 | dBm/  18.36MHz | -56.71 | -56.71 | -56.71 |
| Config 4 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| SSB RP Note4 | Config 1 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 2 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 3 | dBm/SCS | -85 | -Infinity | -Infinity |
| Config 4 | dBm/SCS | -88 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.16.6.6.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 |
| EPRE ratio of PSS to SSS | | dB | 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 | |
| Note 3 | Config 1 | dBm/SCS | -98 | -98 | -98 |
| Config 2 | dBm/SCS | -98 | -98 | -98 |
| Config 3 | dBm/SCS | -95 | -95 | -95 |
| Config 4 | dBm/SCS | -98 | -98 | -98 |
| PRS | Config 1 | dB | -5.45 | -11.67 | -11.67 |
| Config 2 | dB | -5.45 | -11.67 | -11.67 |
| Config 3 | dB | -5.45 | -11.67 | -11.67 |
| Config 4 | dB | -5.45 | -11.67 | -11.67 |
| SSB | Config 1,2,3,4 | dB | 10 | 3 | 3 |
| Io Note 4 | Config 1 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| Config 2 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| Config 3 | dBm/  18.36MHz | -65.61 | -65.61 | -65.61 |
| Config 4 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| SSB RP Note4 | Config 1 | dBm/SCS | -88 | -95 | -95 |
| Config 2 | dBm/SCS | -88 | -95 | -95 |
| Config 3 | dBm/SCS | -85 | -92 | -92 |
| Config 4 | dBm/SCS | -88 | -95 | -95 |
| PRS | | dB | -6.00 | -12.98 | -12.98 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. The Io is calculated based only on the symbols in which PRS is transmitted. | | | | | |

##### A.16.6.6.1.2 Test Requirements

The RSTD measurement time without FH for RedCap fulfils the requirements specified in Clause 9.9A.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.2A.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 each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD1970049.

## **--- End of Change # 6 ---**

## **--- Start of Change # 7 ---**

#### A.16.6.6.2 NR RSTD measurement reporting delay test case with PRS frequency hopping

##### A.16.6.6.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9A.2.6 in an environment with AWGN propagation conditions in FR1 in standalone scenario when frequency hopping is configured.

The supported test configurations are specified in Table A.16.6.6.2.1-1.

Table A.16.6.6.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50MHz, HD-FDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: UE with 1Rx or 2Rx is required to meet the same requirements specified in this clause. | |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All 3 cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

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

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

The test requirements apply when *frequencyHopping* is configured to UE.

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

The UE is configured with measurement gap pattern ID # 24 or #0 before T2.

The general test parameters are listed in Table A.16.6.6.2.1-2, and cell specific test parameters are listed in Table A.16.6.6.2.1-3.

Table A.16.6.6.2.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| CD-SSB configuration | Config 1, 2, 4 |  | SSB.1 FR1 |  |
| Config 3 |  | SSB.1 RedCap FR1 |
| NCD-SSB configuration | Config 1, 2, 4 |  | SSB.6 RedCap FR1 |  |
| Config 3 |  | SSB.7 RedCap FR1 |  |
| SMTC configuration | Config 1, 4 |  | SMTC.4 RedCap |  |
| Config 2 |  | SMTC.2 RedCap |
| Config 3 |  | SMTC.2 RedCap |
| PRS Configuration | Config 1, 4 |  | PRS.1.5 FR1 | PRS configured with frequency hopping as specified in clause A.3.31 |
| Config 2 |  | PRS.1.5 FR] |
| Config 3 |  | PRS.2.6 FR1 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| Measurement gap | |  | GP#24 or GP#0 | GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance ta specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [34] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |

Table A.16.6.6.2.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| PDSCH RMC configuration | Config 1, 4 |  | SR.1.1 FDD | N/A | N/A |
| Config 2 |  | SR.1.1 TDD |
| Config 3 |  | SR.2.1 TDD |
| RMSI CORESET RMC configuration | Config 1, 4 |  | CR.1.1 FDD | N/A | N/A |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET RMC configuration | Config 1, 4 |  | CCR.1.1 FDD | N/A | N/A |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| OCNG Patterns | Config 1,2,3,4 |  | OP.1 | OP.1 | OP.1 |
| RMSI CORESET RMC configuration | Config 1, 4 |  | CR.1.1 FDD | N/A | N/A |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Initial BWP configuration | Config 1,2,3,4 |  | DLBWP.0.1 ULBWP.0.1 | N/A | N/A |
| Active DL BWP configuration | Config 1,2,3,4 |  | DLBWP.1.3 RedCap | N/A | N/A |
| Active UL BWP configuration | Config 1,2,3,4 |  | ULBWP.1.3 RedCap | N/A | N/A |
| Note 3 | Config 1, 4 | dBm/SCS | -98 | | |
| Config 2 | dBm/SCS | -98 | | |
| Config 3 | dBm/SCS | -95 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| SSB | | dB | 10 | -Infinity | -Infinity |
| Io Note 4 | Config 1, 4 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| Config 2 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| Config 3 | dBm/  38.16MHz | -53.54 | -53.54 | -53.54 |
| SSB RP Note4 | Config 1, 4 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 2 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 3 | dBm/SCS | -85 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.16.6.6.2.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| **T2** | **T2** | **T2** |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 |
| Note 3 | Config 1, 4 | dBm/SCS | -98 | -98 | -98 |
| Config 2 | dBm/SCS | -98 | -98 | -98 |
| Config 3 | dBm/SCS | -95 | -95 | -95 |
| PRS | Config 1, 4 | dB | -5.45 | -11.67 | -11.67 |
| Config 2 | dB | -5.45 | -11.67 | -11.67 |
| Config 3 | dB | -5.45 | -11.67 | -11.67 |
| SSB | Config 1,2,3,4 | dB | 10 | 3 | 3 |
| Io Note 4 | Config 1, 4 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| Config 2 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| Config 3 | dBm/  38.16MHz | -62.43 | -62.43 | -62.43 |
| SSB RP Note4 | Config 1, 4 | dBm/SCS | -88 | -95 | -95 |
| Config 2 | dBm/SCS | -88 | -95 | -95 |
| Config 3 | dBm/SCS | -85 | -92 | -92 |
| PRS | | dB | -6.00 | -12.98 | -12.98 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. The Io is calculated based only on the symbols in which PRS is transmitted. | | | | | |

##### A.16.6.6.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9A.2.6.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9A.2.6 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD1970049.

## **--- End of Change # 7 ---**

## **--- Start of Change # 8 ---**

#### A.16.6.7.1 UE Rx-Tx measurement reporting delay test case for single positioning frequency layer in FR1 SA for RedCap UE without RX FH in RRC\_CONNECTED mode

##### A.16.6.7.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement without RX FH reported by the RedCap UE meets the requirements specified in clause 9.9A.4.5 in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured. The measurement reporting delay test defined in this clause is valid for both 1Rx and 2Rx RedCap UEs.

The supported test configurations in listed in Table A.16.6.7.1.1-1.

Table A.16.6.7.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

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

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *NR-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12], shall be provided to the UE during T1. The measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform UE Rx-Tx time difference measurement with RX FH via *NR-Multi-RTT-RequestLocationInformation* or the UE is configured by the LMF to perform UE Rx-Tx time difference measurement with RX FH via *NR-Multi-RTT-RequestLocationInformation* but reports the UE Rx-Tx time difference measurement based on the single hop in *NR-Multi-RTT-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The last TTI containing the two messages shall be provided to the RedCap UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the multi-RTT assistance data and location information request. The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The RedCap UE is configured with measurement gap pattern ID #0 or ID #24 before T2.

The RedCap UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.16.6.7.1.1-2 and Table A.16.6.7.1.1-3, respectively.

Table A.16.6.7.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1,2,3,4 | Cell 1 | Cell 1 is the reference cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1,2,3,4 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1,2,3,4 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1,4 | 10: NRB,c = 52 |  |
| 2 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 52 |  |
| SSB configuration |  | 1,4 | SSB.4 RedCap FR1 |  |
|  |  | 2 | SSB.4 RedCap FR1 |  |
|  |  | 3 | SSB.5 RedCap FR1 |  |
| SMTC configuration |  | 1,4 | SMTC.1 RedCap |  |
|  |  | 2 | SMTC.1 RedCap |  |
|  |  | 3 | SMTC.1 RedCap |  |
| Measurement gap |  | 1,2,3,4 | GP#24 or GP#0 Note 1 |  |
| CP length |  | 1,2,3,4 | Normal |  |
| DRX |  | 1,2,3,4 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1,2,3,4 | 3 | Synchronous cells |
| T1 | s | 1,2,3,4 | 5 |  |
| T2 | s | 1,2,3,4 | 10 |  |
| Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

Table A.16.6.7.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  |  | T1 | T2 | T1 | T2 | |
| TDD configuration |  | 1,4 | N/A | | N/A | | |
|  | 2 | TDDConf.1.1 | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | | |
| PDSCH RMC configuration |  | 1,4 | SR.1.1 FDD | | N/A | | |
|  | 2 | SR.1.1 TDD | |  | | |
|  | 3 | SR.2.1 TDD | |  | | |
| RMSI CORESET RMC configuration |  | 1,4 | CR.1.1 FDD | | N/A | | |
|  | 2 | CR.1.1 TDD | |
|  |  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1,4 | CCR.1.1 FDD | | N/A | | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1,2,3,4 | OP.1 | | OP.1 | | |
| EPRE ratio of PSS to SSS | dB | 1,2,3,4 | 0 | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1,4 | TRS.1.1 FDD | | N/A | | |
|  | 2 | TRS.1.1 TDD | |
|  |  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1,2,3,4 | DLBWP.0.1 ULBWP.0.1 | | N/A | | |
| Active DL BWP configuration |  | 1,2,3,4 | DLBWP.1.1 RedCap | | N/A | | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 RedCap | | N/A | | |
| PRS configuration |  | 1,4 | PRS.1.1 FR1 | | PRS.1.1 FR1 | | |
| 2 | PRS.1.1 FR1 | | PRS.1.1 FR1 | | |
| 3 | PRS.2.1 FR1 | | PRS.2.1 FR1 | | |
| PRS muting info |  | 1,2,3,4 | ‘10’ | | ‘01’ | | |
| SRS configuration |  | 1,4 | POS-SRS.1 | | N/A | | |
| 2 | POS-SRS.1 | | N/A | | |
| 3 | POS-SRS.2 | | N/A | | |
| Note 2 | dBm/SCS | 1,4 | -98 | | | | |
|  | 2 | -98 | | | | |
|  | 3 | -95 | | | | |
| PRS | dB | 1,4 | -Infinity | -2.41 | -Infinity | | -12.12 |
|  | 2 |  |  |  | |  |
|  |  | 3 |  |  |  | |  |
| PRS | dB | 1,4 | -Infinity | -2 | -Infinity | | -10 |
|  | 2 |  |  |  | |  |
|  | 3 |  |  |  | |  |
| PRP Note 3 | dBm/SCS kHz | 1,4 | -Infinity | -100 | -Infinity | | -108 |
|  | 2 | -Infinity | -100 | -Infinity | | -108 |
|  | 3 | -Infinity | -97 | -Infinity | | -105 |
| Io | dBm/9.36 MHz | 1,4 | N/A | -66.22 | N/A | | -66.22 |
| dBm/9.36 MHz | 2 | -66.22 | -66.22 |
| dBm/18.72 MHz | 3 | -63.22 | -63.22 |
| Propagation Condition |  | 1,2,3,4 | AWGN | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.  Note 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. | | | | | | | |

##### A.16.6.7.1.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9A.4.5.

The UE shall perform and report the UE Rx-Tx time difference measurements without RX FH for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time 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 each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1A.18.3.

## **--- End of Change # 8 ---**

## **--- Start of Change # 9 ---**

#### A.16.6.7.2 UE Rx-Tx time difference measurement with Rx FH for single positioning frequency layer in FR1 SA in RRC\_CONNECTED state

##### A.16.6.7.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement with Rx FH in RRC\_CONNECTED state meets the requirements specified in clause 9.9A.4.8 in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are listed in Table A.16.6.7.2.1-1.

Table A.16.6.7.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, UE bandwidth 10MHz, Cell bandwidth 50MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10MHz, Cell bandwidth 50MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20MHz, Cell bandwidth 100MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10MHz, Cell bandwidth 50MHz, HD-FDD duplex mode |
| NOTE: The RedCap UE is only required to be tested in one of the supported test configurations. | |

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

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

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

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

The UE is configured with measurement gap pattern ID #0 or ID #24 before T2.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.16.6.7.2.1-2 and Table A.16.6.7.2.1-3, respectively.

Table A.16.6.7.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1, 2, 3, 4 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1, 2, 4 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 2, 4 | SSB.1 FR1 |  |
|  |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 2, 3, 4 | SMTC.1 |  |
| Measurement gap |  | 1, 2, 3, 4 | GP#24 or GP#0 Note 1 |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX |  | 1, 2, 3, 4 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1, 2, 3, 4 | 3 | Synchronous cells |
| PRS RX hopping request |  | 1, 2, 3, 4 | Requested |  |
| T1 | s | 1, 2, 3, 4 | 5 |  |
| T2 | s | 1, 2, 3, 4 | 10 |  |
| Note 1: GP#24 is configured if RedCap UE supports MG#24, otherwise GP#0 is configured. | | | | |

Table A.16.6.7.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  |  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3, 4 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  |  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1  ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.1.1 RedCap | | N/A | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 RedCap | | N/A | |
| PRS configuration |  | 1, 4 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 2 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 3 | PRS.2.6 FR1 | | PRS.2.6 FR1 | |
| PRS muting info |  | 1, 2, 3, 4 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1, 4 | POS-SRS.1 | | N/A | |
|  | 2 | POS-SRS.1 | | N/A | |
|  | 3 | POS-SRS.2 | | N/A | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  | 2 | -Infinity | -100 | -Infinity | -108 |
|  | 3 | -Infinity | -97 | -Infinity | -105 |
| Io | dBm/19.08 MHz | 1, 4 | 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, 4 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the RedCap 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: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.7.2.2 Test requirements

The UE Rx-Tx time difference measurement time in RRC\_CONNECTED state fulfils the requirements specified in clause 9.9A.4.8.

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

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 each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1A.18.3.

## **--- End of Change # 9 ---**

## **--- Start of Change # 10 ---**

#### A.16.6.8.1 PRS-RSRP measurement delay test case for single positioning frequency layer

##### A.16.6.8.1.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRP measurement meets the delay requirements specified in clause 9.9.3.5 in an environment with AWGN propagation conditions. The test is applicable to 1 Rx or 2 Rx RedCap UE.

The supported test configurations are specified in Table A.16.6.8.1.1-1.

Table A.16.6.8.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD 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 measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform PRS-RSRP measurement with RX FH via *NR-DL-AoD-RequestLocationInformation* or the UE is configured by the LMF to perform PRS-RSRP measurement with RX FH but reports the PRS-RSRP measurement based on the single hop in *NR-DL-AoD-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

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

The general test parameters are listed in Table A.16.6.8.1.1-2, and cell specific test parameters are listed in Table A.16.6.8.1.1-3.

Table A.16.6.8.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Reference cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1, 2, 4 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 2, 4 | SSB.1 FR1 |  |
|  |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 2, 3, 4 | SMTC.1 RedCap |  |
| Measurement gap |  | 1, 2, 3, 4 | GP#24 or GP#0 Note 1 |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX |  | 1, 2, 3, 4 | NA | OFF |
| Time offset between serving and neighbour cells | s | 1, 2, 3, 4 | 3 | Synchronous cells |
| Expected RSTD | s | 1, 2, 3, 4 | 3 |  |
| Expected RSTD uncertainty | s | 1, 2, 3, 4 | 5 |  |
| T1 | s | 1, 2, 3, 4 | 2 |  |
| T2 | s | 1, 2, 3, 4 | 5 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

Table A.16.6.8.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |
|  | 3 | SR.2.1.TDD | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1.TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3, 4 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| 2 | TRS.1.1 TDD | |
| 3 | TRS.2.1 TDD | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.1.1  RedCap | | N/A | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1  RedCap | | N/A | |
| PRS configuration |  | 1, 4 | PRS.1.3 FR1 | | PRS.1.3 FR1 | |
|  | 2 | PRS.1.3 FR1 | | PRS.1.3 FR1 | |
|  | 3 | PRS.2.3 FR1 | | PRS.2.3 FR1 | |
| PRS muting info |  | 1, 2, 3, 4 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| Io | dBm/9.36 MHz | 1, 4 | N/A | -66.22 | N/A | -66.22 |
|  | dBm/9.36 MHz | 2 | -66.22 | -66.22 |
|  | dBm/18.72 MHz | 3 | -63.22 | -63.22 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.6.8.1.2 Test Requirements

The UE shall perform and report the PRS-RSRP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9.3.5, 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 limit 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%, where the reported PRS-RSRP measurement for each correct event shall be within the reporting range specified in clause 10.1A.17.3.

## **--- End of Change # 10 ---**

## **--- Start of Change # 11 ---**

#### A.16.6.8.2 PRS-RSRP measurement delay with FH in RRC\_CONNECTED state in FR1

##### A.16.6.8.2.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRP measurement withFH by a RedCap UE meets the delay requirements specified in clause 9.9A.3.6 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.16.6.8.2.1-1.

Table A.16.6.8.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, UE bandwith 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwith 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwith 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwith 10 MHz, Cell bandwidth 50 MHz, HD-FDD 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.16.6.8.2.1-2, and cell specific test parameters are listed in Table A.16.6.8.2.1-3.

Table A.16.6.8.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Reference cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1, 2, 4 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 2, 4 | SSB.1 FR1 |  |
|  |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 2, 3, 4 | SMTC.1 RedCap |  |
| Measurement gap |  | 1, 2, 3, 4 | GP#24 or GP#0 Note 1 |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX |  | 1, 2, 3, 4 | NA | OFF |
| Time offset between serving and neighbour cells | μs | 1, 2, 3, 4 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3, 4 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3, 4 | 5 |  |
| PRS RX hopping request |  | 1, 2, 3, 4 | Present |  |
| T1 | s | 1, 2, 3, 4 | 2 |  |
| T2 | s | 1, 2, 3, 4 | 5 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

Table A.16.6.8.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3, 4 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.1.1 RedCap | | N/A | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 RedCap | | N/A | |
| PRS configuration |  | 1, 4 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 2 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 3 | PRS.2.6 FR1 | | PRS.2.6 FR1 | |
| PRS muting info |  | 1, 2, 3, 4 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| Io | dBm/9.36 MHz | 1, 4 | -70.05 | -67.67 | -70.05 | -67.67 |
|  | dBm/9.36 MHz | 2 | -70.05 | -67.67 | -70.05 | -67.67 |
|  | dBm/18.36 MHz | 3 | -67.13 | -64.75 | -67.13 | -64.75 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. | | | | | | |

##### A.16.6.8.2.2 Test Requirements

The UE shall perform and report the PRS-RSRP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9A.3.6, 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 limit 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%, where the reported PRS-RSRP measurement for each correct event shall be within the reporting range specified in clause 10.1A.17.3.

## **--- End of Change # 11 ---**

## **--- Start of Change # 12 ---**

#### A.16.6.9.1 PRS-RSRPP measurement delay without FH in RRC\_CONNECTED state in FR1

##### A.16.6.9.1.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement without FH by a RedCap UE meets the delay requirements specified in clause 9.9A.5.5 in an environment with a 2-tap channel propagation condition.

The supported test configurations are specified in Table A.16.6.9.1.1-1.

Table A.16.6.9.1.11: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD 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.16.6.9.1.1-2, and cell specific test parameters are listed in Table A.16.6.9.1.1-3.

Table A.16.6.9.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Reference cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1, 2, 4 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 2, 4 | SSB.1 FR1 |  |
|  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 2, 3, 4 | SMTC.1 RedCap |  |
| Measurement gap |  | 1, 2, 3, 4 | GP#24 or GP#0 Note 1 |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX |  | 1, 2, 3, 4 | NA | OFF |
| Time offset between serving and neighbour cells | μs | 1, 2, 3, 4 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3, 4 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3, 4 | 5 |  |
| PRS RX hopping request |  | 1, 2, 3, 4 | NOT present |  |
| T1 | s | 1, 2, 3, 4 | 2 |  |
| T2 | s | 1, 2, 3, 4 | 5 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

Table A.16.6.9.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.1.1 RedCap | | N/A | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 RedCap | | N/A | |
| PRS configuration |  | 1, 4 | PRS.1.3 FR1 | | PRS.1.3 FR1 | |
|  | 2 | PRS.1.3 FR1 | | PRS.1.3 FR1 | |
|  | 3 | PRS.2.3 FR1 | | PRS.2.3 FR1 | |
| PRS muting info |  | 1, 2, 3, 4 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/9.36 MHz | 1, 4 | -70.05 | -67.67 | -70.05 | -67.67 |
|  | dBm/9.36 MHz | 2 | -70.05 | -67.67 | -70.05 | -67.67 |
|  | dBm/18.36 MHz | 3 | -67.13 | -64.75 | -67.13 | -64.75 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.  Note 4: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. | | | | | | |

##### A.16.6.9.1.2 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 9.9A.5.5, 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%, where the reported PRS-RSRPP measurement for each correct event shall be within the reporting range specified in clause 10.1A.19.3.

## **--- End of Change # 12 ---**

## **--- Start of Change # 13 ---**

#### A.16.6.9.2 PRS-RSRPP measurement with Rx FH reporting delay test case for single positioning frequency layer in FR1 SA in RRC\_CONNECTED state

##### A.16.6.9.2.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement with Rx FH in RRC\_CONNECTED state meets the delay requirements specified in clause 9.9A.5.8 in an environment with two-tap channel propagation conditions in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.16.6.9.2.1-1.

Table A.16.6.9.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| Note: The RedCap 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.16.6.9.2.1-2, and cell specific test parameters are listed in Table A.16.6.9.2.1-3.

Table A.16.6.9.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Reference cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1, 4 | 10: NRB,c = 52 |  |
| 2 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 4 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 4 | SMTC.1 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| Measurement gap |  | 1, 2, 3, 4 | GP#24 or GP#0 Note 1 |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX |  | 1, 2, 3, 4 | NA | OFF |
| Time offset between serving and neighbour cells | μs | 1, 2, 3, 4 | 3 | Synchronous cells |
| PRS RX hopping request |  | 1, 2, 3, 4 | Requested |  |
| Expected RSTD | μs | 1, 2, 3, 4 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3, 4 | 5 |  |
| T1 | s | 1, 2, 3, 4 | 5 |  |
| T2 | s | 1, 2, 3, 4 | 10 |  |
| NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | |

Table A.16.6.9.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 RedCap | | N/A | |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 RedCap | | N/A | |
| PRS configuration |  | 1, 4 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 2 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 3 | PRS.2.6 FR1 | | PRS.2.6 FR1 | |
| PRS muting info |  | 1, 2, 3, 3 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/9.36 MHz | 1, 4 | N/A | -67.92 | N/A | -69.63 |
|  | dBm/9.36 MHz | 2 |  | -67.92 |  | -69.63 |
|  | dBm/18.36 MHz | 3 |  | -65.01 |  | -66.72 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.6.9.2.2 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 9.9A.5.8, 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 each 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 10.1A.19.3, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

## **--- End of Change # 13 ---**

## **--- Start of Change # 14 ---**

#### A.16.7.7.1 RSTD measurement accuracy test case for RedCap UE without FH

##### A.16.7.7.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC CONNECTED state meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.16.7.7.1.1-1.

Table A.16.7.7.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD 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. GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the RedCap UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 9.9A.2.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

Table A.16.7.7.1.1-2: RSTD accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| PRS ARFCN | 1,2,3,4 |  | freq1 | Freq1 |
| BWchannel | 1 | MHz | 10: NRB,c = 52 | |
| 2 | 10: NRB,c = 52 | |
| 3 | 20: NRB,c = 51 | |
| 4 | 10: NRB,c = 52 | |
| Duplex mode | 1 |  | FDD | |
| 2 | TDD | |
| 3 | TDD | |
| 4 | HD-FDD | |
| TDD configuration | 1 |  | N/A | |
| 2 | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | |
| 4 | N/A | |
| Measurement gap | 1, 2, 3, 4 |  | GP#24 or GP#0 | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - |
| 2 | SR.1.1 TDD |  |
| 3 | SR.2.1 TDD |  |
| 4 | SR.1.1 FDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - |
| 2 | CR.1.1 TDD | - |
| 3 | CR.2.1 TDD | - |
| 4 | CR.1.1 FDD |  |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - |
| 2 | CCR.1.1 TDD | - |
| 3 | CCR.2.1 TDD | - |
| 4 | CCR.1.1 FDD |  |
| SSB configuration | 1 |  | SSB.1 FR1 | |
| 2 | SSB.1 FR1 | |
| 3 | SSB.1 RedCap FR1 | |
| 4 | SSB.1 FR1 | |
| OCNG Patterns | 1,2,3,4 |  | OP.1 | |
| TRS configuration | 1 |  | TRS.1.1 FDD | - |
| 2 | TRS.1.1 TDD |  |
| 3 | TRS.1.2 TDD |  |
| 4 | TRS.1.1 FDD |  |
| Initial BWP Configuration | 1,2,3,4 |  | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1,2,3,4 |  | DLBWP.1.1  ULBWP.1.1 | |
| Time offset with Cell 1 | 1,2,3,4 | μs | - | 3 |
| SMTC configuration | 1,4 |  | SMTC.2 | |
| 2,3 | SMTC.1 | |
| PRS configuration | 1 |  | PRS.1.1 FR1 | |
| 2 | PRS.1.1 FR1 | |
| 3 | PRS.2.1 FR1 | |
| 4 | PRS.1.1 FR1 | |
| PRS Resource slot offset | 1, 2, 3, 4 | slot | 0 | 4 |
| Expected RSTD | 1, 2, 3, 4 | μs | N/A | 3 |
| Expected RSTD uncertainty | 1, 2, 3, 4 | μs | N/A | 5 |
| EPRE ratio of PSS to SSS | 1,2,3,4 | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS | 1,2,3,4 | dB | 0 | 0 |
| Note2 | 1,2,4 | dBm/ SCS | -98 | |
| 3 | -95 | |
| PRS | 1,2,3,4 | dB | -6 | -13 |
| PRPNote3 | 1,2,4 | dBm/SCS | -103.7 | -109.9 |
| 3 | -100.7 | -106.9 |
| IoNote3 | 1,2,4 | dBm/  9.36MHz | -68.8 | -68.8 |
| 3 | dBm/  18.36MHz | -65.88 | -65.88 |
| PRS | 1,2,3,4 | dB | -5.7 | -11.9 |
| Propagation condition | 1,2,3,4 | - | AWGN | |
| Antenna configuration | 1,2,3,4 |  | 1x2 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The Io is calculated based only on the symbols in which PRS is transmitted.  Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | |

##### A.16.7.7.1.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 14 ---**

## **--- Start of Change # 15 ---**

A.16.7.7.2 RSTD measurement accuracy test case for RedCap UE with FH in RRC\_CONNECTED state

A.16.7.7.2.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE with FH in RRC CONNECTED state meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.16.7.7.2.1-1.

**Table A.16.7.7.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: UE with 1Rx or 2Rx is required to meet the same requirements specified in this clause. | |

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 cells. Both cells are on the same NR RF channel in FR1. GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the RedCap UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 9.9A.2.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* as specified in TS 37.355 [34, clause 6.5.12]. The frequency hopping configurations are specified in clause A.3.31.

**Table A.16.7.7.2.1-2: RSTD accuracy test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | |
| **Cell 1** | **Cell 2** |
| PRS ARFCN | 1,2,3,4 |  | freq1 | Freq1 |
| BWchannel | 1 | MHz | 10: NRB,c = 52 | |
| 2 | 10: NRB,c = 52 | |
| 3 | 20: NRB,c = 51 | |
| 4 | 10: NRB,c = 52 | |
| Duplex mode | 1 |  | FDD | |
| 2 | TDD | |
| 3 | TDD | |
| 4 | HD-FDD | |
| TDD configuration | 1 |  | N/A | |
| 2 | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | |
| 4 | N/A | |
| Measurement gap | 1, 2, 3, 4 |  | GP#24 or GP#0 | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - |
| 2 | SR.1.1 TDD |  |
| 3 | SR.2.1 TDD |  |
| 4 | SR.1.1 FDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - |
| 2 | CR.1.1 TDD | - |
| 3 | CR.2.1 TDD | - |
| 4 | CR.1.1 FDD |  |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - |
| 2 | CCR.1.1 TDD | - |
| 3 | CCR.2.1 TDD | - |
| 4 | CCR.1.1 FDD |  |
| SSB configuration | 1 |  | SSB.1 FR1 | |
| 2 | SSB.1 FR1 | |
| 3 | SSB.1 RedCap FR1 | |
| 4 | SSB.1 FR1 | |
| OCNG Patterns | 1,2,3,4 |  | OP.1 | |
| TRS configuration | 1 |  | TRS.1.1 FDD | - |
| 2 | TRS.1.1 TDD |  |
| 3 | TRS.1.2 TDD |  |
| 4 | TRS.1.1 FDD |  |
| Initial BWP Configuration | 1,2,3,4 |  | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1,2,3,4 |  | DLBWP.1.1  ULBWP.1.1 | |
| Time offset with Cell 1 | 1,2,3,4 | μs | - | 3 |
| SMTC configuration | 1,4 |  | SMTC.2 | |
| 2,3 | SMTC.1 | |
| PRS configuration | 1 |  | PRS.1.5 FR1 | |
| 2 | PRS.1.5 FR1 | |
| 3 | PRS.2.6 FR1 | |
| 4 | PRS.1.5 FR1 | |
| PRS Resource slot offset | 1, 2, 3, 4 | slot | 0 | 4 |
| Expected RSTD | 1, 2, 3, 4 | μs | N/A | 3 |
| Expected RSTD uncertainty | 1, 2, 3, 4 | μs | N/A | 5 |
| EPRE ratio of PSS to SSS | 1,2,3,4 | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS | 1,2,3,4 | dB | 0 | 0 |
| Note2 | 1,2,4 | dBm/ SCS | -98 | |
| 3 | -95 | |
| PRS | 1,2,3,4 | dB | -6 | -13 |
| PRPNote3 | 1,2,4 | dBm/SCS | -103.7 | -109.9 |
| 3 | -100.7 | -106.9 |
| IoNote3 | 1,2,4 | dBm/  9.36MHz | -68.8 | -68.8 |
| 3 | dBm/  18.36MHz | -65.88 | -65.88 |
| PRS | 1,2,3,4 | dB | -5.7 | -11.9 |
| Propagation condition | 1,2,3,4 | - | AWGN | |
| Antenna configuration | 1,2,3,4 |  | 1x2 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The Io is calculated based only on the symbols in which PRS is transmitted.  Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification. | | | | |

A.16.7.7.2.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 15 ---**

## **--- Start of Change # 16 ---**

#### A.16.7.8.1 UE Rx-Tx time difference measurement accuracy for single positioning frequency layer in FR1 SA for RedCap UE without RX FH in RRC\_CONNECTED mode

##### A.16.7.8.1.1 Test purpose and environment

The purpose of the test is to verify that the accuracy of the UE Rx-Tx time difference measurement without RX FH reported by the RedCap UE is within the specified limits in clause 10.1A.18.2. The test is conducted in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations is listed in Table A.16.7.8.1.1-1.

Table A.16.7.8.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

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

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12], shall be provided to the UE before the start of the test. The UE Rx-Tx measurement accuracy test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform UE Rx-Tx time difference measurement with RX FH via *NR-Multi-RTT-RequestLocationInformation* or the UE is configured by the LMF to perform UE Rx-Tx time difference measurement with RX FH via *NR-Multi-RTT-RequestLocationInformation* but reports the UE Rx-Tx time difference measurement based on the single hop in *NR-Multi-RTT-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

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

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

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

##### A.16.7.8.1.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.16.7.8.1.2-1.

Table A.16.7.8.1.2-1: UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | **Cell 2** |
| RF Channel Number |  | 1,2,3,4 | 1 | 1 |
| Measurement gap |  | 1,2,3,4 | GP#24 or GP#0 Note 4 | |
| DRX |  | 1,2,3,4 | OFF | |
| Time offset with Cell 1 | μs | 1,2,3,4 | N/A | 3 |
| TDD configuration |  | 1,4 | N/A | N/A |
| 2 | TDDConf.1.1 | TDDConf.1.1 |
| 3 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH RMC configuration |  | 1,4 | SR.1.1 FDD | N/A |
| 2 | SR.1.1 TDD |
| 3 | SR.2.1 TDD |
| RMSI CORESET RMC configuration |  | 1,4 | CR.1.1 FDD | N/A |
| 2 | CR.1.1 TDD |
| 3 | CR.2.1 TDD |
| Dedicated CORESET RMC configuration |  | 1,4 | CCR.1.1 FDD | N/A |
| 2 | CCR.1.1 TDD |
| 3 | CCR.2.1 TDD |
| OCNG Patterns |  | 1,2,3,4 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 1,2,3,4 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1,4 | TRS.1.1 FDD | N/A |
| 2 | TRS.1.1 TDD |
| 3 | TRS.1.2 TDD |
| Initial BWP configuration |  | 1,2,3,4 | DLBWP.0.1  ULBWP.0.1 | N/A |
| Active DL BWP configuration |  | 1,2,3,4 | DLBWP.1.1 RedCap | N/A |
| Active UL BWP configuration |  | 1,2,3,4 | ULBWP.1.1 RedCap | N/A |
| PRS configuration |  | 1,4 | PRS.1.1 FR1 | PRS.1.1 FR1 |
| 2 | PRS.1.1 FR1 | PRS.1.1 FR1 |
| 3 | PRS.2.1 FR1 | PRS.2.1 FR1 |
| PRS Resource slot offset | slot | 1,2,3,4 | 0 | 4 |
| SRS configuration |  | 1,4 | POS-SRS.1 | N/A |
| 2 | POS-SRS.1 | N/A |
| 3 | POS-SRS.2 | N/A |
| Note 2 | dBm/SCS | 1,4 | -98 | |
| 2 | -98 | |
| 3 | -95 | |
| PRS | dB | 1,2,3,4 | -2.41 | -12.12 |
| PRS | dB | 1,2,3,4 | -2 | -10 |
| PRP Note 3 | dBm/SCS kHz | 1,4 | -100 | -108 |
| 2 | -100 | -108 |
| 3 | -97 | -105 |
| Io | dBm/9.36 MHz | 1,4 | -66.22 | -66.22 |
| dBm/9.36 MHz | 2 | -66.22 | -66.22 |
| dBm/18.72 MHz | 3 | -63.22 | -63.22 |
| Propagation Condition |  | 1,2,3,4 | AWGN | |

##### A.16.7.8.1.3 Test requirements

The UE Rx-Tx time difference measurement without RX FH fulfils the UE Rx-Tx measurement accuracy requirements for AWGN propagation condition specified in the clause 10.1A.18.2.

## **--- End of Change # 16 ---**

## **--- Start of Change # 17 ---**

#### A.16.7.8.2 SA: UE Rx-Tx time difference measurement accuracy TC with Rx FH in RRC\_CONNECTED state in FR1

##### A.16.7.8.2.1 Test purpose and Environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy in RRC\_CONNECTED with FH by a RedCap UE is within the specified limits. This test will verify the requirements in clause 10.1A.18.2.3 and 10.1A.18.2.4. The test is conducted in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.16.7.8.2.1-1.

Table A.16.7.8.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

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

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test. The test requirements apply when *frequencyHopping* is configured to UE.

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

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

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

##### A.16.7.8.2.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.16.7.8.2.2-1.

Table A.16.7.8.2.2-1: UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| RF Channel Number |  | 1,2,3,4 | 1 | 1 | 1 | 1 |
| Measurement gap |  | 1,2,3,4 | GP#24 or GP#0 Note 4 | | GP#24 or GP#0 Note 4 | |
| DRX |  | 1,2,3,4 | OFF | | OFF | |
| Time offset with Cell 1 | μs | 1, 2, 3, 4 | N/A | 3 | N/A | 3 |
| TDD configuration |  | 1, 4 | N/A | N/A | N/A | N/A |
|  | 2 | TDDConf.1.1 | TDDConf.1.1 | TDDConf.1.1 | TDDConf.1.1 |
|  |  | 3 | TDDConf.2.1 | TDDConf.2.1 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | N/A | SR.1.1 FDD | N/A |
|  | 2 | SR.1.1 TDD |  | SR.1.1 TDD |
|  | 3 | SR.2.1 TDD |  | SR.2.1 TDD |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | N/A | CR.1.1 FDD | N/A |
|  | 2 | CR.1.1 TDD | CR.1.1 TDD |
|  |  | 3 | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | N/A | CCR.1.1 FDD | N/A |
|  | 2 | CCR.1.1 TDD | CCR.1.1 TDD |
|  | 3 | CCR.2.1 TDD | CCR.2.1 TDD |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | OP.1 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3, 4 | 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 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1, 4 | TRS.1.1 FDD | N/A | TRS.1.1 FDD | N/A |
|  | 2 | TRS.1.1 TDD | TRS.1.1 TDD |
|  | 3 | TRS.1.2 TDD | TRS.1.2 TDD |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | N/A | DLBWP.0.1 ULBWP.0.1 | N/A |
| Active DL BWP configuration |  | 1, 2, 3, 4 | DLBWP.1.1 | N/A | DLBWP.1.1 | N/A |
| Active UL BWP configuration |  | 1, 2, 3, 4 | ULBWP.1.1 | N/A | ULBWP.1.1 | N/A |
| PRS configuration |  | 1, 4 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  |  | 2 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  |  | 3 | PRS.2.6 FR1 | PRS.2.6 FR1 | PRS.2.6 FR1 | PRS.2.6 FR1 |
| PRS Resource slot offset | slot | 1, 2, 3, 4 | 0 | 4 | 0 | 4 |
| SRS configuration |  | 1, 4 | POS-SRS.1 | N/A | POS-SRS.1 | N/A |
|  |  | 2 | POS-SRS.1 | N/A | POS-SRS.1 | N/A |
|  |  | 3 | POS-SRS.2 | N/A | POS-SRS.2 | N/A |
| Note 2 | dBm/SCS | 1 | -98 | | -98 | |
| 2 | -98 | | -98 | |
| 3 | -95 | | -95 | |
| 4 | -98 | | -98 | |
| Note 2 | dBm/15 kHz | 1 | -98 | | -98 | |
| 2 |
| 3 |
| 4 |
| PRS | dB | 1 | -2.41 | -12.12 | -2.41 | -12.12 |
| 2 |
| 3 |
| 4 |
| PRS | dB | 1 | -2 | -10 | -2 | -10 |
| 2 |
| 3 |
| 4 |
| PRP Note 3 | dBm/SCS kHz | 1 | -100 | -108 | -100 | -108 |
| 2 | -100 | -108 | -100 | -108 |
| 3 | -97 | -105 | -97 | -105 |
| 4 | -100 | -108 | -100 | -108 |
| Io | dBm/19.08 MHz | 1 | -64.57 | -64.57 | -64.57 | -64.57 |
| dBm/19.08 MHz | 2 | -64.57 | -64.57 | -64.57 | -64.57 |
| dBm/47.88 MHz | 3 | -60.59 | -60.59 | -60.59 | -60.59 |
| dBm/19.08 MHz | 4 | -64.57 | -64.57 | -64.57 | -64.57 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | | | |

##### A.16.7.8.2.3 Test requirements

The UE Rx-Tx time difference measurement fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1A.18.2.3 and 10.1A.18.2.4 for both Cell 1 and Cell 2.

## **--- End of Change # 17 ---**

## **--- Start of Change # 18 ---**

#### A.16.7.9.1 PRS-RSRP measurement accuracy without FH in RRC\_CONNECTED state in FR1

##### A.16.7.9.1.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement in RRC\_CONNECTED without FH by a RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1A.17.2.

##### A.16.7.9.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.7.9.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in A.16.7.9.1.2-2. In all test cases, Cell 1 is the PCell. PRS RX hopping is not requested in *NR-DL-AoD-RequestLocationInformation*.

Table A.16.7.9.1.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.7.9.1.2-2: PRS-RSRP test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | |
|  | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID | | |  | 489 | 0 | 489 | 0 |
| SSB ARFCN | | |  | freq1 | | freq1 | |
| Duplex mode | | Config 1,4 |  | FDD | | | |
|  | | Config 2,3 |  | TDD | | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | |
| BWchannel | | Config 1,2,4 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 2 |  | 20: NRB,c = 51 | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 RedCap | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 RedCap | | | |
| TRS configuration | | Config 1,4 |  | 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 6 | | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | 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 1,4 |  | 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 1,4 |  | 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 1,4 |  | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 |
|  | | Config 2 |  | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 |
|  | | Config 3 |  | PRS.2.3 FR1 | PRS.2.3 FR1 | PRS.2.3 FR1 | PRS.2.3 FR1 |
| PRS Resource slot offset (slot) | | Config 1,2,3,4 | slot | 0 | 4 | 0 | 4 |
| SSB configuration | | Config 1,4 |  | 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.1 RedCap FR1 | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 |
| Time offset with Cell 1 | | Config 1,4 | μs | - | 3 | - | 3 |
|  | | Config 2,3 | - | 3 | - | 3 |
| Expected RSTD | | Config 1,2,3,4 | μs | 3 | | | |
| Expected RSTD uncertainty | | Config 1,2,3,4 | μs | 5 | | | |
| SMTC configuration | | Config 1,2,3,4 |  | SMTC.1 RedCap | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |
| EPRE ratio of PRS to SSS | | | dB | 0 | 0 | 0 | 0 |
| Note2 | Config 1,2,4 |  | dBm/15KhZ | -98 | | -98 | |
| Config 3 |  | -98 | | -98 | |
| Note2 | Config 1,2,4 | | dBm/SCS | -98 | | -98 | |
| Config 3 |  | -95 | | -95 | |
| PRS | | | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| PRS | | | dB | -2 | -10 | -2 | -10 |
| PRP Note3 | Config 1,2,4 |  | dBm/SCS | -100 | -108 | -100 | -108 |
|  | Config 3 |  |  | -97 | -105 | -97 | -105 |
| IoNote3 | Config 1,2,4 |  | dBm/9.36MHz | -67.67 | | -67.67 | |
| Config 3 |  | dBm/18.36MHz | -64.75 | | -64.75 | |
| Propagation condition | | |  | AWGN | | | |
| Antenna configuration | | |  | 1x2 | | | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.  Note 6: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | | | | |

##### A.16.7.9.1.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.2.

## **--- End of Change # 18 ---**

## **--- start of Change # 19 ---**

#### A.16.7.9.2 PRS-RSRP measurement accuracy with FH in RRC\_CONNECTED state in FR1

##### A.16.7.9.2.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement in RRC\_CONNECTED with FH by a RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1A.17.2.

##### A.16.7.9.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.7.9.2.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in A.16.7.9.2.2-2. In all test cases, Cell 1 is the PCell. PRS RX hopping is present in *NR-DL-AoD-RequestLocationInformation*.

Table A.16.7.9.2.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.7.9.2.2-2: PRS-RSRP test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | Test 2 | |
|  | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Cell ID | | |  | 489 | 0 | 489 | 0 |
| SSB ARFCN | | |  | freq1 | | freq1 | |
| Duplex mode | | Config 1,4 |  | FDD | | | |
|  | | Config 2,3 |  | TDD | | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | |
| BWchannel | | Config 1,2,4 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 20: NRB,c = 51 | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 RedCap | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 RedCap | | | |
| TRS configuration | | Config 1,4 |  | 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 6 | | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | 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 1,4 |  | 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 1,4 |  | 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 1,4 |  | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  | | Config 2 |  | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  | | Config 3 |  | PRS.2.6 FR1 | PRS.2.6 FR1 | PRS.2.6 FR1 | PRS.2.6 FR1 |
| PRS Resource slot offset (slot) | | Config 1,2,3,4 | slot | 0 | 4 | 0 | 4 |
| SSB configuration | | Config 1,4 |  | 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.1 RedCap FR1 | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 |
| Time offset with Cell 1 | | Config 1,4 | μs | - | 3 | - | 3 |
|  | | Config 2,3 | - | 3 | - | 3 |
| Expected RSTD | | Config 1,2,3,4 | μs | 3 | | | |
| Expected RSTD uncertainty | | Config 1,2,3,4 | μs | 5 | | | |
| SMTC configuration | | Config 1,2,3,4 |  | SMTC.1 RedCap | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |  |  |
| EPRE ratio of PRS to SSS | | | dB | 0 | 0 | 0 | 0 |
| Note2 | Config 1,2,4 |  | dBm/15KhZ | -98 | | -98 | |
| Config 3 |  | -98 | | -98 | |
| Note2 | Config 1,2,4 | | dBm/SCS | -98 | | -98 | |
| Config 3 |  | -95 | | -95 | |
| PRS | | | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| PRS | | | dB | -2 | -10 | -2 | -10 |
| PRP Note3 | Config 1,2,4 |  | dBm/SCS | -100 | -108 | -100 | -108 |
|  | Config 3 |  |  | -97 | -105 | -97 | -105 |
| IoNote3 | Config 1,2,4 |  | dBm/9.36MHz | -67.67 | | -67.67 | |
| Config 3 |  | dBm/18.36MHz | -64.75 | | -64.75 | |
| Propagation condition | | |  | AWGN | | | |
| Antenna configuration | | |  | 1x2 | | | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.  Note 6: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | | | | |

##### A.16.7.9.2.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.2.

## **--- End of Change # 19 ---**

## **--- Start of Change # 20 ---**

A.16.7.10.1 PRS-RSRPP measurement accuracy without FH in RRC\_CONNECTED state in FR1

##### A.16.7.10.1.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRPP measurement in RRC\_CONNECTED without FH by a RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1A.19.2.

##### A.16.7.10.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.7.10.1.2-1. Both absolute accuracy of PRS-RSRPP measurements are tested by using the parameters in A.16.7.10.1.2-2. In all test cases, Cell 1 is the PCell. PRS RX hopping is not requested in *NR-DL-AoD-RequestLocationInformation*.

Table A.16.7.10.1.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.16.7.10.1.2-2: PRS-RSRPP test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | Cell 2 |
|  | | |  |
| Cell ID | | |  | 489 | 0 |
| SSB ARFCN | | |  | freq1 | |
| Duplex mode | | Config 1,4 |  | FDD | |
|  | | Config 2,3 |  | TDD | |
| TDD configuration | | Config 1,4 |  | Not Applicable | |
|  | | Config 2 |  | TDDConf.1.1 | |
|  | | Config 3 |  | TDDConf.2.1 | |
| BWchannel | | Config 1,2,4 | MHz | 10: NRB,c = 52 | |
|  | | Config 2 |  | 20: NRB,c = 51 | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 RedCap | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 RedCap | |
| TRS configuration | | Config 1,4 |  | TRS.1.1 FDD | NA |
|  | | Config 2 |  | TRS.1.1 TDD | NA |
|  | | Config 3 |  | TRS.1.2 TDD | NA |
| DRX Cycle | | | ms | Not Applicable | |
| Measurement gap | | |  | GP#24 or GP#0 Note 6 | |
| PDSCH Reference measurement channel | | Config 1,4 |  | SR.1.1 FDD | - |
|  | | Config 2 |  | SR.1.1 TDD |  |
|  | | Config 3 |  | SR2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD | - |
|  | | Config 2 |  | CR.1.1 TDD |  |
|  | | Config 3 |  | CR2.1 TDD |  |
| Control channel RMC | | Config 1,4 |  | CCR.1.1 FDD | - |
|  | | Config 2 |  | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR2.1 TDD |  |
| PRS configuration | | Config 1,4 |  | PRS.1.3 FR1 | PRS.1.3 FR1 |
|  | | Config 2 |  | PRS.1.3 FR1 | PRS.1.3 FR1 |
|  | | Config 3 |  | PRS.2.3 FR1 | PRS.2.3 FR1 |
| PRS Resource slot offset (slot) | | Config 1,2,3,4 | slot | 0 | 4 |
| SSB configuration | | Config 1,4 |  | SSB.1 FR1 | SSB.1 FR1 |
|  | | Config 2 |  | SSB.1 FR1 | SSB.1 FR1 |
|  | | Config 3 |  | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 |
| Time offset with Cell 1 | | Config 1,4 | μs | - | 3 |
|  | | Config 2,3 | - | 3 |
| Expected RSTD | | Config 1,2,3,4 | μs | 3 | |
| Expected RSTD uncertainty | | Config 1,2,3,4 | μs | 5 | |
| SMTC configuration | | Config 1,2,3,4 |  | SMTC.1 RedCap | |
| OCNG Patterns | | |  | OCNG pattern 1 | |
| 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) | | |  |  |  |
| EPRE ratio of PRS to SSS | | | dB | 0 | 0 |
| Note2 | Config 1,2,4 |  | dBm/15KhZ | -98 | |
| Config 3 |  | -98 | |
| Note2 | Config 1,2,4 | | dBm/SCS | -98 | |
| Config 3 |  | -95 | |
| PRS | | | dB | -2.41 | -12.12 |
| PRS | | | dB | -2 | -10 |
| PRP Note3 | Config 1,2,4 |  | dBm/SCS | -100 | -108 |
|  | Config 3 |  |  | -97 | -105 |
| IoNote3 | Config 1,2,4 |  | dBm/9.36MHz | -67.67 | |
| Config 3 |  | dBm/18.36MHz | -64.75 | |
| Propagation condition | | |  | AWGN | |
| Antenna configuration | | |  | 1x2 | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.  Note 6: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | | |

##### A.16.7.10.1.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.19.2.

## **--- End of Change # 20 ---**

## **--- Start of Change # 21 ---**

#### A.16.7.10.2 SA: PRS-RSRPP measurement accuracy TC with Rx FH in RRC\_CONNECTED state in FR1

##### A.16.7.10.2.1 Test purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRPP measurement in RRC\_CONNECTED with FH by a RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1A.19.2.

##### A.16.7.10.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.7.10.2.2-1. Both absolute and relative accuracy of PRS-RSRPP measurements are tested by using the parameters in A.16.7.10.2.2-2. In all test cases, Cell 1 is the PCell. PRS RX hopping is requested in *NR-DL-AoD-RequestLocationInformation*.

Table A.16.7.10.2.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

Table A.16.7.10.2.2-2: PRS-RSRPP test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | Cell 2 |
|  | | |  |
| Cell ID | | |  | 489 | 0 |
| SSB ARFCN | | |  | freq1 | |
| Duplex mode | | Config 1,4 |  | FDD | |
|  | | Config 2,3 |  | TDD | |
| TDD configuration | | Config 1,4 |  | Not Applicable | |
|  | | Config 2 |  | TDDConf.1.1 | |
|  | | Config 3 |  | TDDConf.2.1 | |
| BWchannel | | Config 1,2,4 | MHz | 20: NRB,c = 52 | |
|  | |  |  |  | |
|  | | Config 3 |  | 50: NRB,c = 51 | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | |
| Downlink dedicated BWP configuration | | |  | DLBWP.1.1 RedCap | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | |
| Uplink dedicated BWP configuration | | |  | ULBWP.1.1 RedCap | |
| TRS configuration | | Config 1,4 |  | TRS.1.1 FDD | NA |
|  | | Config 2 |  | TRS.1.1 TDD | NA |
|  | | Config 3 |  | TRS.1.2 TDD | NA |
| DRX Cycle | | | ms | Not Applicable | |
| Measurement gap | | |  | GP#24 or GP#0 Note 6 | |
| PDSCH Reference measurement channel | | Config 1,4 |  | SR.1.1 FDD | - |
|  | | Config 2 |  | SR.1.1 TDD |  |
|  | | Config 3 |  | SR2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD | - |
|  | | Config 2 |  | CR.1.1 TDD |  |
|  | | Config 3 |  | CR2.1 TDD |  |
| Control channel RMC | | Config 1,4 |  | CCR.1.1 FDD | - |
|  | | Config 2 |  | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR2.1 TDD |  |
| PRS configuration | | Config 1,4 |  | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  | | Config 2 |  | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  | | Config 3 |  | PRS.2.6 FR1 | PRS.2.6 FR1 |
| PRS Resource slot offset (slot) | | Config 1,2,3,4 | slot | 0 | 4 |
| SSB configuration | | Config 1 |  | SSB.1 FR1 | SSB.1 FR1 |
|  | | Config 2 |  | SSB.1 FR1 | SSB.1 FR1 |
|  | | Config 3 |  | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 |
| Time offset with Cell 1 | | Config 1 | ms | - | 3 |
|  | | Config 2,3 | μs | - | 3 |
| Expected RSTD | | Config 1,2,3,4 | μs | 3 | |
| Expected RSTD uncertainty | | Config 1,2,3,4 |  | 5 | |
| SMTC configuration | | Config 1,2,3,4 |  | SMTC.1 RedCap | |
| OCNG Patterns | | |  | OCNG pattern 1 | |
| 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) | | |  |  |  |
| EPRE ratio of PRS to SSS | | | dB | 0 | 0 |
| Note2 | Config 1,2,4 |  | dBm/15KhZ | -98 | |
| Config 3 |  | -98 | |
| Note2 | Config 1,2,4 | | dBm/SCS | -98 | |
| Config 3 |  | -95 | |
| *PRS* | | | dB | -2.41 | -12.12 |
| PRS | | | dB | -2 | -10 |
| PRS-RSRPP Note3 | Config 1, 2,4 |  | dBm/SCS | -100 | -108 |
|  | Config 3 |  |  | -97 | -105 |
| IoNote3 | Config 1,2,4 |  | dBm/19.08MHz | -64.57 | |
| Config 3 |  | dBm/47.88MHz | -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 6: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. | | | | | |

##### A.16.7.10.2.3 Test requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.19.2.

## **--- End of Change # 21 ---**

## **--- Start of Change # 22 ---**

#### A.16.8.1.1 NR RSTD measurement reporting delay test case for for RedCap UE without FH in FR1 SA in RRC\_INACTIVE state

##### A.16.8.1.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC INACTIVE state meets the requirements specified in Clause 5.6A.4.5 in an environment with AWGN propagation conditions in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.16.8.1.1.1-1.

Table A.16.8.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All 3 cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2 and Cell 3. During T2 UE shall be in RRC\_INACTIVE state and all three cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the RedCap UE during T1. The measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The last TTI containing the two messages shall be provided to the RedCap UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request. The beginning of the time interval T2 shall be aligned with the first DRX cycle containing a DL PRS resource(s).

The UE is configured with DRX cycle of 1.28s.

The general test parameters are listed in Table A.16.8.1.1.1-2, and cell specific test parameters are listed in Table A.16.8.1.1.1-3 and Table A.16.8.1.1.1-4.

Table A.16.8.1.1.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| SSB configuration | Config 1 |  | SSB.1 FR1 |  |
| Config 2 |  | SSB.1 FR1 |
| Config 3 |  | SSB.1 RedCap FR1 |
| Config 4 |  | SSB.1 FR1 |
| SMTC configuration | Config 1 |  | SMTC.2 |  |
| Config 2 |  | SMTC.1 |
| Config 3 |  | SMTC.1 |
| Config 4 |  | SMTC.2 |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| Config 2 |  | SR.1.1 TDD |
| Config 3 |  | SR.2.1 TDD |
| Config 4 |  | SR.1.1 FDD |
| RMSI CORESET RMC configuration | Config 1 |  | CR.1.1 FDD | As specified in clause A.3.1.2 |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Config 4 |  | CR.1.1 FDD |
| Dedicated CORESET RMC configuration | Config 1 |  | CCR.1.1 FDD |  |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| Config 4 |  | CCR.1.1 FDD |
| Initial BWP configuration | Config 1,2,3,4 |  | DLBWP.0.1  ULBWP.0.1 |  |
| Active UL BWP configuration | Config 1,2,3,4 |  | ULBWP.1.1 |  |
| PRS Configuration | Config 1 |  | PRS.1.1 FR1 | As specified in clause A.3.31 |
| Config 2 |  | PRS.1.1 FR1 |
| Config 3 |  | PRS.2.1 FR1 |
| Config 4 |  | PRS.1.1 FR1 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | | s | 1.28 |  |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance ta specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 4 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [34] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 5 | The length of the time interval that follows immediately after time interval T1. |

Table A.16.8.1.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -98 | | |
| Config 2 | dBm/SCS | -98 | | |
| Config 3 | dBm/SCS | -95 | | |
| Config 4 | dBm/SCS | -98 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| SSB | | dB | 10 | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| Config 2 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| Config 3 | dBm/  18.36MHz | -56.71 | -56.71 | -56.71 |
| Config 4 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| SSB RP Note4 | Config 1 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 2 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 3 | dBm/SCS | -85 | -Infinity | -Infinity |
| Config 4 | dBm/SCS | -88 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.16.8.1.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -98 | -98 | -98 |
| Config 2 | dBm/SCS | -98 | -98 | -98 |
| Config 3 | dBm/SCS | -95 | -95 | -95 |
| Config 4 | dBm/SCS | -98 | -98 | -98 |
| PRS | Config 1 | dB | -5.45 | -11.67 | -11.67 |
| Config 2 | dB | -5.45 | -11.67 | -11.67 |
| Config 3 | dB | -5.45 | -11.67 | -11.67 |
| Config 4 | dB | -5.45 | -11.67 | -11.67 |
| Io Note 4 | Config 1 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| Config 2 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| Config 3 | dBm/  18.36MHz | -65.61 | -65.61 | -65.61 |
| Config 4 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T2) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

## **--- End of Change # 22 ---**

## **--- Start of Change # 23 ---**

##### A.16.8.1.1.2 Test Requirements

The RSTD measurement time without FH for RedCap fulfils the requirements specified in Clause 5.6A.4.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 5.6A.4.5 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 each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD1970049.

## **--- End of Change # 23 ---**

## **--- Start of Change # 24 ---**

#### A.16.8.1.2 NR RSTD measurement reporting delay test case with PRS frequency hopping

##### A.16.8.1.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 5.6A.4.6 in an environment with AWGN propagation conditions in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.16.8.1.2.1-1.

Table A.16.8.1.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: UE with 1Rx or 2Rx is required to meet the same requirements specified in this clause. | |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All 3 cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2 and Cell 3. During T2 UE shall be in RRC\_INACTIVE state and all three cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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

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

The test requirements apply when *frequencyHopping* is configured to UE.

The beginning of the time interval T2 shall be aligned with the first DRX cycle containing a DL PRS resource(s).

The UE is configured with DRX cycle of 1.28s.

The general test parameters are listed in Table A.16.8.1.2.1-2, and cell specific test parameters are listed in Table A.16.8.1.2.1-3 and Table A.16.8.1.2.1-4.

Table A.16.8.1.2.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| CD-SSB configuration | Config 1, 4 |  | SSB.1 FR1 |  |
| Config 2 |  | SSB.1 FR1 |
| Config 3 |  | SSB.1 RedCap FR1 |
| NCD-SSB configuration | Config 1, 4 |  | SSB.6 RedCap FR1 | NCD-SSB is configured within dedicated RedCap DL BWP. |
| Config 2 |  | SSB.6 RedCap FR1 |
| Config 3 |  | SSB.7 RedCap FR1 |
| SMTC configuration | Config 1, 4 |  | SMTC.4 RedCap |  |
| Config 2 |  | SMTC.2 RedCap |
| Config 3 |  | SMTC.2 RedCap |
| PDSCH RMC configuration | Config 1, 4 |  | SR.1.1 FDD |  |
| Config 2 |  | SR.1.1 TDD |  |
| Config 3 |  | SR.2.1 TDD |  |
| RMSI CORESET RMC configuration | Config 1, 4 |  | CR.1.1 FDD |  |
| Config 2 |  | CR.1.1 TDD |  |
| Config 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET RMC configuration | Config 1, 4 |  | CCR.1.1 FDD |  |
| Config 2 |  | CCR.1.1 TDD |  |
| Config 3 |  | CCR.2.1 TDD |  |
| Initial BWP configuration | Config 1,2,3,4 |  | DLBWP.0.1  ULBWP.0.1 |  |
| Active UL BWP configuration | Config 1,2,3,4 |  | ULBWP.1.1 |  |
| PRS Configuration | Config 1, 4 |  | PRS.1.5 FR1 | PRS configured with frequency hopping as specified in clause A.3.31 |
| Config 2 |  | PRS.1.5 FR1 |
| Config 3 |  | PRS.2.6 FR1 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | | s | 1.28 |  |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance ta specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [34] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 5 | The length of the time interval that follows immediately after time interval T1. |

Table A.16.8.1.2.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | N/A | N/A |
| Note 3 | Config 1, 4 | dBm/SCS | -98 | | |
| Config 2 | dBm/SCS | -98 | | |
| Config 3 | dBm/SCS | -95 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| SSB | | dB | 10 | -Infinity | -Infinity |
| Io Note 4 | Config 1, 4 | dBm/  9.36MHz | -68.63 | -70.05 | -70.05 |
| Config 2 | dBm/  9.36MHz | -68.63 | -70.05 | -70.05 |
| Config 3 | dBm/  38.16MHz | -63.20 | -63.96 | -63.96 |
| SSB RP Note4 | Config 1, 4 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 2 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 3 | dBm/SCS | -88 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.16.8.1.2.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 |
| Note 3 | Config 1, 4 | dBm/SCS | -98 | -98 | -98 |
| Config 2 | dBm/SCS | -98 | -98 | -98 |
| Config 3 | dBm/SCS | -95 | -95 | -95 |
| PRS | Config 1, 4 | dB | -5.45 | -11.67 | -11.67 |
| Config 2 | dB | -5.45 | -11.67 | -11.67 |
| Config 3 | dB | -5.45 | -11.67 | -11.67 |
| Io Note 4 | Config 1, 4 | dBm/  9.36MHz | -69.59 | -69.93 | -69.93 |
| Config 2 | dBm/  96.48MHz | -69.59 | -69.93 | -69.93 |
| Config 3 | dBm/  38.16MHz | -63.72 | -63.89 | -63.89 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T2) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

##### A.16.8.1.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 5.6A.4.6.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 5.6A.4.6 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD1970049.

## **--- End of Change # 24 ---**

## **--- Start of Change # 25 ---**

#### A.16.8.2.1 UE Rx-Tx measurement reporting delay test case for single positioning frequency layer in FR1 SA for RedCap UE without RX FH in RRC\_INACTIVE mode

##### A.16.8.2.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement without RX FH reported by the RedCap UE meets the requirements specified in clause 5.6A.6.5 in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured. The measurement reporting delay test defined in this clause is valid for both 1Rx and 2Rx RedCap UEs.

The supported test configurations in listed in Table A.16.8.2.1.1-1.

Table A.16.8.2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

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

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12], shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE. The measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform UE Rx-Tx time difference measurement with RX FH via *NR-Multi-RTT-RequestLocationInformation* or the UE is configured by the LMF to perform UE Rx-Tx time difference measurement with RX FH via *NR-Multi-RTT-RequestLocationInformation* but reports the UE Rx-Tx time difference measurement based on the single hop in *NR-Multi-RTT-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The RedCap UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.16.8.2.1.1-2 and Table A.16.8.2.1.1-3, respectively.

Table A.16.8.2.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Active cell |  | 1,2,3,4 | Cell 1 | Cell 1 is the reference cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1,2,3,4 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1,2,3,4 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1,4 | 10: NRB,c = 52 |  |
| 2 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 52 |  |
| SSB configuration |  | 1,4 | SSB.4 RedCap FR1 |  |
|  | 2 | SSB.4 RedCap FR1 |  |
|  | 3 | SSB.5 RedCap FR1 |  |
| SMTC configuration |  | 1,4 | SMTC.1 RedCap |  |
|  | 2 | SMTC.1 RedCap |  |
|  | 3 | SMTC.1 RedCap |  |
| CP length |  | 1,2,3,4 | Normal |  |
| DRX cycle |  | 1,2,3,4 | 1.28s |  |
| Time offset between serving and neighbour cells | μs | 1,2,3,4 | 3 | Synchronous cells |
| T1 | s | 1,2,3,4 | 5 |  |
| T2 | s | 1,2,3,4 | 10 |  |

Table A.16.8.2.1.1-3: Cell specific test parameters.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1,4 | N/A | | N/A | |
| 2 | TDDConf.1.1 | | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1,4 | SR.1.1 FDD | | N/A | |
| 2 | SR.1.1 TDD | |  | |
| 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1,4 | CR.1.1 FDD | | N/A | |
| 2 | CR.1.1 TDD | |
| 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1,4 | CCR.1.1 FDD | | N/A | |
| 2 | CCR.1.1 TDD | |
| 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1,2,3,4 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1,2,3,4 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1,4 | TRS.1.1 FDD | | N/A | |
| 2 | TRS.1.1 TDD | |
| 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1,2,3,4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| PRS configuration |  | 1,4 | PRS.1.1 FR1 | | PRS.1.1 FR1 | |
| 2 | PRS.1.1 FR1 | | PRS.1.1 FR1 | |
| 3 | PRS.2.1 FR1 | | PRS.2.1 FR1 | |
| PRS muting info |  | 1,2,3,4 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1,4 | POS-SRS.1 | | N/A | |
| 2 | POS-SRS.1 | | N/A | |
| 3 | POS-SRS.2 | | N/A | |
| Note 2 | dBm/SCS | 1,4 | -98 | | | |
| 2 | -98 | | | |
| 3 | -95 | | | |
| PRS | dB | 1,4 | -Infinity | -2.41 | -Infinity | -12.12 |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| PRS | dB | 1,4 | -Infinity | -2 | -Infinity | -10 |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| PRP Note 3 | dBm/SCS kHz | 1,4 | -Infinity | -100 | -Infinity | -108 |
| 2 | -Infinity | -100 | -Infinity | -108 |
| 3 | -Infinity | -97 | -Infinity | -105 |
| Io | dBm/9.36 MHz | 1,4 | N/A | -66.22 | N/A | -66.22 |
| dBm/9.36 MHz | 2 | -66.22 | -66.22 |
| dBm/18.72 MHz | 3 | -63.22 | -63.22 |
| Propagation Condition |  | 1,2,3,4 | AWGN | | | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.  NOTE 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | | | |

##### A.16.8.2.1.2 Test requirements

The UE Rx-Tx time difference measurement time in RRC\_INACTIVE state fulfils the requirements specified in clause 5.6A.6.5.

The UE shall perform and report the UE Rx-Tx time difference measurements without RX FH for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

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

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause clause 10.1A.18.3 for both Cell 1 and Cell 2.

## **--- End of Change # 25 ---**

## **--- Start of Change # 26 ---**

#### A.16.8.2.2 UE Rx-Tx time difference measurement with Rx FH for single positioning frequency layer in FR1 SA in RRC\_INACTIVE state

##### A.16.8.2.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement with Rx FH in RRC\_INACTIVE state meets the requirements specified in clause 5.6A.6.6 in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are listed in Table A.16.8.2.2.1-1.

Table A.16.8.2.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| NOTE: The RedCap UE is only required to be tested in one of the supported test configurations. | |

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

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE state.

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.16.8.2.2.1-2 and Table A.16.8.2.2.1-3 respectively.

Table A.16.8.2.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Active cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1, 2, 3, 4 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1, 2, 4 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 2 ,4 | SSB.1 FR1 |  |
|  |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 2, 3 ,4 | SMTC.1 |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX cycle |  | 1, 2, 3, 4 | 1.28s |  |
| Time offset between serving and neighbour cells | μs | 1, 2, 3, 4 | 3 | Synchronous cells |
| PRS RX hopping request |  | 1, 2, 3, 4 | requested |  |
| T1 | s | 1, 2, 3, 4 | 5 |  |
| T2 | s | 1, 2, 3, 4 | 10 |  |

Table A.16.8.2.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
|  |  | **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  |  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1, 2, 3, 4 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  |  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| PRS configuration |  | 1, 4 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 2 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 3 | PRS.2.6 FR1 | | PRS.2.6 FR1 | |
| PRS muting info |  | 1, 2, 3, 4 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1, 4 | POS-SRS.1 | | N/A | |
|  |  | 2 | POS-SRS.1 | | N/A | |
|  |  | 3 | POS-SRS.2 | | N/A | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| PRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  | 2 | -Infinity | -100 | -Infinity | -108 |
|  | 3 | -Infinity | -97 | -Infinity | -105 |
| Io | dBm/19.08 MHz | 1, 4 | 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, 4 | AWGN | | | |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | | |

##### A.16.8.2.2.2 Test requirements

The UE Rx-Tx time difference measurement time in RRC\_INACTIVE state fulfils the requirements specified in clause 5.6A.6.6.

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

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

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1A.18.3 for both Cell 1 and Cell 2.

## **--- End of Change # 26 ---**

## **--- Start of Change # 27 ---**

#### A.16.8.3.1 PRS-RSRP reporting delay test case for single positioning frequency layer in RRC\_INACTIVE

##### A.16.8.3.1.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRP measurement in RRC\_INACTIVE meets the delay requirements specified in clause 9.9A.3.5 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.16.8.3.1.1-1.

Table A.16.8.3.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD 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.

During T1 UE is in RRC\_CONNECTED, 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 measurement reporting delay test in this clause is valid in the cases where the RedCap UE is either not configured by the LMF to perform PRS-RSRP measurement with RX FH via *NR-DL-AoD-RequestLocationInformation* or the UE is configured by the LMF to perform PRS-RSRP measurement with RX FH and reports the PRS-RSRP measurement based on the single hop in *NR-DL-AoD-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12]. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the 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.16.8.3.1.1-2, and cell specific test parameters are listed in Table A.16.8.3.1.1-3.

Table A.16.8.3.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Reference cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1, 2, 4 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 2, 4 | SSB.1 FR1 |  |
|  |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 2, 3, 4 | SMTC.1 RedCap |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX |  | 1, 2, 3, 4 | 1.28s |  |
| Time offset between serving and neighbour cells | μs | 1, 2, 3, 4 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3, 4 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3, 4 | 5 |  |
| T1 | s | 1, 2, 3, 4 | 2 |  |
| T2 | s | 1, 2, 3, 4 | 6 |  |

Table A.16.8.3.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| PRS configuration |  | 1, 4 | 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, 4 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/9.36 MHz | 1, 4 | N/A | -66.22 | N/A | -66.22 |
|  | dBm/9.36 MHz | 2 | -66.22 | -66.22 |
|  | dBm/18.72 MHz | 3 | -63.22 | -63.22 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | | |
| NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: SS-RSRP/PRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.8.3.1.2 Test Requirements

The UE shall perform and report the PRS-RSRP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9A.3.5, 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%, where the reported PRS-RSRP measurement for each correct event shall be within the reporting range specified in clause 10.1A.17.3.

## **--- End of Change # 27 ---**

## **--- Start of Change # 28 ---**

A.16.8.4.1 PRS-RSRPP measurement delay without FH in RRC\_INACTIVE state in FR1

A.16.8.4.1.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement without FH by a RedCap UE meets the delay requirements specified in clause 5.6A.7.5 in an environment with a 2-tap channel propagation condition.

The supported test configurations are specified in Table A.16.8.4.1.1-1.

**Table A.16.8.4.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD 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.16.8.4.1.1-2, and cell specific test parameters are listed in Table A.16.8.4.1.1-3.

**Table A.16.8.4.1.1-2: General test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Reference cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1, 2, 4 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 2, 4 | SSB.1 FR1 |  |
|  |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 2, 3, 4 | SMTC.1 RedCap |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX | s | 1, 2, 3, 4 | 1.28 | ON |
| Time offset between serving and neighbour cells | μs | 1, 2, 3, 4 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3, 4 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3, 4 | 5 |  |
| PRS RX hopping request |  | 1, 2, 3, 4 | NOT present |  |
| T1 | s | 1, 2, 3, 4 | 2 |  |
| T2 | s | 1, 2, 3, 4 | 5 |  |

**Table A.16.8.4.1.1-3: Cell specific test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| PRS configuration |  | 1, 4 | PRS.1.3 FR1 | | PRS.1.3 FR1 | |
|  | 2 | PRS.1.3 FR1 | | PRS.1.3 FR1 | |
|  | 3 | PRS.2.3 FR1 | | PRS.2.3 FR1 | |
| PRS muting info |  | 1, 2, 3, 4 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -3 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/9.36 MHz | 1, 4 | -70.05 | -67.67 | -70.05 | -67.67 |
|  | dBm/9.36 MHz | 2 | -70.05 | -67.67 | -70.05 | -67.67 |
|  | dBm/18.36 MHz | 3 | -67.13 | -64.75 | -67.13 | -64.75 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.  NOTE 4: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. | | | | | | |

A.16.8.4.1.2 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 5.6A.7.5, 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%, where the reported PRS-RSRPP measurement for each correct event shall be within the PRS-RSRPP reporting range specified in Clause 10.1A.19.3.

## **--- End of Change # 28 ---**

## **--- Start of Change # 29 ---**

#### A.16.8.4.2 PRS-RSRPP measurement with Rx FH reporting delay test case for single positioning frequency layer in FR1 SA in RRC\_INACTIVE state

##### A.16.8.4.2.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement with Rx FH in RRC\_INACTIVE state meets the delay requirements specified in clause 5.6A.7.6 in an environment with two-tap channel propagation conditions in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.16.8.4.2.1-1.

Table A.16.8.4.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| NOTE: The RedCap 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. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The test requirements apply when *frequencyHopping* is configured to UE.

The beginning of the time interval T2 shall be aligned with the first DRX cycle containing a DL PRS resource occasion occuring 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.16.8.4.2.1-2, and cell specific test parameters are listed in Table A.16.8.4.2.1-3.

Table A.16.8.4.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Reference cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1, 4 | 10: NRB,c = 52 |  |
| 2 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 4 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 4 | SMTC.1 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX | s | 1, 2, 3, 4 | 1.28 |  |
| Time offset between serving and neighbour cells | μs | 1, 2, 3, 4 | 3 | Synchronous cells |
| PRS RX hopping request |  | 1, 2, 3, 4 | requested |  |
| Expected RSTD | μs | 1, 2, 3, 4 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3, 4 | 5 |  |
| T1 | s | 1, 2, 3, 4 | 5 |  |
| T2 | s | 1, 2, 3, 4 | 10 |  |

Table A.16.8.4.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1, 4 | TRS.1.1 FDD | | N/A | |
|  | 2 | TRS.1.1 TDD | |
|  | 3 | TRS.1.2 TDD | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| PRS configuration |  | 1, 4 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 2 | PRS.1.5 FR1 | | PRS.1.5 FR1 | |
|  | 3 | PRS.2.6 FR1 | | PRS.2.6 FR1 | |
| PRS muting info |  | 1, 2, 3, 3 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/9.36 MHz | 1, 4 | N/A | -67.92 | N/A | -69.63 |
|  | dBm/9.36 MHz | 2 |  | -67.92 |  | -69.63 |
|  | dBm/18.36 MHz | 3 |  | -65.01 |  | -66.72 |
| Propagation Condition |  | 1, 2, 3, 4 | 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.16.8.4.2.2 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 5.6A.7.6, starting from the beginning of time interval T2.

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

The rate of the correct events for each 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 10.1A.19.3, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

## **--- End of Change # 29 ---**

## **--- Start of Change # 30 ---**

#### A.16.9.1.1 RSTD measurement accuracy test case for RedCap UE without FH in FR1 in RRC\_INACTIVE state

##### A.16.9.1.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC\_INACTIVE state meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.16.9.1.1.1-1.

Table A.16.9.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD 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 UE is configured with DRX cycle of 1.28 s. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the RedCap UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 5.6A.4.5.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

Table A.16.9.1.1.1-2: RSTD accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| PRS ARFCN | 1,2,3,4 |  | freq1 | Freq1 |
| BWchannel | 1 | MHz | 10: NRB,c = 52 | |
| 2 | 10: NRB,c = 52 | |
| 3 | 20: NRB,c = 51 | |
| 4 | 10: NRB,c = 52 | |
| Duplex mode | 1 |  | FDD | |
| 2 | TDD | |
| 3 | TDD | |
| 4 | HD-FDD | |
| TDD configuration | 1 |  | N/A | |
| 2 | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | |
| 4 | N/A | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - |
| 2 | SR.1.1 TDD |  |
| 3 | SR.2.1 TDD |  |
| 4 | SR.1.1 FDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - |
| 2 | CR.1.1 TDD | - |
| 3 | CR.2.1 TDD | - |
| 4 | CR.1.1 FDD |  |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - |
| 2 | CCR.1.1 TDD | - |
| 3 | CCR.2.1 TDD | - |
| 4 | CCR.1.1 FDD | - |
| SSB configuration | 1 |  | SSB.1 FR1 | |
| 2 | SSB.1 FR1 | |
| 3 | SSB.1 RedCap FR1 | |
| 4 | SSB.1 FR1 | |
| OCNG Patterns | 1,2,3,4 |  | OP.1 | |
| TRS configuration | 1 |  | TRS.1.1 FDD | - |
| 2 | TRS.1.1 TDD |  |
| 3 | TRS.1.2 TDD |  |
| 4 | TRS.1.1 FDD |  |
| Initial BWP Configuration | 1,2,3,4 |  | DLBWP.0.1  ULBWP.0.1 | |
| Time offset with Cell 1 | 1,4 | μs | - | 3 |
| 2,3 | - | 3 |
| SMTC configuration | 1,4 |  | SMTC.2 | |
| 2,3 | SMTC.1 | |
| PRS configuration | 1 |  | PRS.1.3 FR1 | |
| 2 | PRS.1.3 FR1 | |
| 3 | PRS.2.3 FR1 | |
| 4 | PRS.1.3 FR1 | |
| PRS muting info | 1,2,3,4 |  | ‘10’ | ‘01’ |
| Expected RSTD | 1, 2, 3, 4 | μs | N/A | 3 |
| Expected RSTD uncertainty | 1, 2, 3, 4 | μs | N/A | 5 |
| EPRE ratio of PSS to SSS | 1,2,3,4 | 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 |
| Note2 | 1,2,4 | dBm/ SCS | -98 | |
| 3 | -95 | |
|  | 1,2,3,4 | dB | -6 | -13 |
| PRS-RSRPNote3 | 1,2,4 | dBm/SCS | -103.7 | -109.9 |
| 3 | -100.7 | -106.9 |
| IoNote3 | 1,2,4 | dBm/  9.36MHz | -68.8 | -68.8 |
| 3 | dBm/  18.36MHz | -65.88 | -65.88 |
|  | 1,2,3,4 | dB | -5.7 | -11.9 |
| Propagation condition | 1,2,3,4 | - | AWGN | |
| Antenna configuration | 1,2,3,4 |  | 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: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

##### A.16.9.1.1.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 30 ---**

## **--- Start of Change # 31 ---**

#### A.16.9.1.2 RSTD measurement accuracy test case for RedCap UE with FH in FR1 in RRC\_INACTIVE state

##### A.16.9.1.2.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE with FH in RRC\_INACTIVE state meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.16.9.1.2.1-1.

**Table A.16.9.1.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD 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 UE is configured with DRX cycle of 1.28 s. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the RedCap UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 5.6A.4.5.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* as specified in TS 37.355 [34, clause 6.5.12]. The frequency hopping configurations are specified in clause A.3.31.

**Table A.16.9.1.2.1-2: RSTD accuracy test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | |
| **Cell 1** | **Cell 2** |
| PRS ARFCN | 1,2,3,4 |  | freq1 | Freq1 |
| BWchannel | 1 | MHz | 10: NRB,c = 52 | |
| 2 | 10: NRB,c = 52 | |
| 3 | 20: NRB,c = 51 | |
| 4 | 10: NRB,c = 52 | |
| Duplex mode | 1 |  | FDD | |
| 2 | TDD | |
| 3 | TDD | |
| 4 | HD-FDD | |
| TDD configuration | 1 |  | N/A | |
| 2 | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | |
| 4 | N/A | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - |
| 2 | SR.1.1 TDD |  |
| 3 | SR.2.1 TDD |  |
| 4 | SR.1.1 FDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - |
| 2 | CR.1.1 TDD | - |
| 3 | CR.2.1 TDD | - |
| 4 | CR.1.1 FDD |  |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - |
| 2 | CCR.1.1 TDD | - |
| 3 | CCR.2.1 TDD | - |
| 4 | CCR.1.1 FDD | - |
| SSB configuration | 1 |  | SSB.1 FR1 | |
| 2 | SSB.1 FR1 | |
| 3 | SSB.1 RedCap FR1 | |
| 4 | SSB.1 FR1 | |
| OCNG Patterns | 1,2,3,4 |  | OP.1 | |
| TRS configuration | 1 |  | TRS.1.1 FDD | - |
| 2 | TRS.1.1 TDD |  |
| 3 | TRS.1.2 TDD |  |
| 4 | TRS.1.1 FDD |  |
| Initial BWP Configuration | 1,2,3,4 |  | DLBWP.0.1  ULBWP.0.1 | |
| Time offset with Cell 1 | 1,4 | μs | - | 3 |
| 2,3 | - | 3 |
| SMTC configuration | 1,4 |  | SMTC.2 | |
| 2,3 | SMTC.1 | |
| PRS configuration | 1 |  | PRS.1.3 FR1 | |
| 2 | PRS.1.3 FR1 | |
| 3 | PRS.2.3 FR1 | |
| 4 | PRS.1.3 FR1 | |
| PRS muting info | 1,2,3,4 |  | ‘10’ | ‘01’ |
| Expected RSTD | 1, 2, 3, 4 | μs | N/A | 3 |
| Expected RSTD uncertainty | 1, 2, 3, 4 | μs | N/A | 5 |
| EPRE ratio of PSS to SSS | 1,2,3,4 | 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 |
| Note2 | 1,2,4 | dBm/ SCS | -98 | |
| 3 | -95 | |
|  | 1,2,3,4 | dB | -6 | -13 |
| PRS-RSRPNote3 | 1,2,4 | dBm/SCS | -103.7 | -109.9 |
| 3 | -100.7 | -106.9 |
| IoNote3 | 1,2,4 | dBm/  9.36MHz | -68.8 | -68.8 |
| 3 | dBm/  18.36MHz | -65.88 | -65.88 |
|  | 1,2,3,4 | dB | -5.7 | -11.9 |
| Propagation condition | 1,2,3,4 | - | AWGN | |
| Antenna configuration | 1,2,3,4 |  | 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: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

##### A.16.9.1.2.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 31 ---**

## **--- Start of Change # 32 ---**

#### A.16.9.2.1 UE Rx-Tx time difference measurement accuracy for single positioning frequency layer in FR1 SA for RedCap UE without RX FH in RRC\_INACTIVE mode

##### A.16.9.2.1.1 Test purpose and environment

The purpose of the test is to verify that the accuracy of the UE Rx-Tx time difference measurement without RX FH reported by the RedCap UE is within the specified limits in clause 10.1A.18.2. The test is conducted in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.16.9.2.1.1-1.

Table A.16.9.2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

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

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12], shall be provided to the UE before the start of the test. The UE Rx-Tx measurement accuracy test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform UE Rx-Tx time difference measurement with RX FH via *NR-Multi-RTT-RequestLocationInformation* or the UE is configured by the LMF to perform UE Rx-Tx time difference measurement with RX FH via *NR-Multi-RTT-RequestLocationInformation* but reports the UE Rx-Tx time difference measurement based on the single hop in *NR-Multi-RTT-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

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

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

##### A.16.9.2.1.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.16.9.2.1.2-1.

Table A.16.9.2.1.2-1: UE Rx-Tx time difference measurement accuracy test parameters.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | Cell 2 |
|  |  |
| RF Channel Number |  | 1,2,3,4 | 1 | 1 |
| DRX | s | 1,2,3,4 | 1.28 | |
| Time offset with Cell 1 | μs | 1,2,3,4 | N/A | 3 |
| TDD configuration |  | 1,4 | N/A | N/A |
| 2 | TDDConf.1.1 | TDDConf.1.1 |
| 3 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH RMC configuration |  | 1,4 | SR.1.1 FDD | N/A |
| 2 | SR.1.1 TDD |  |
| 3 | SR.2.1 TDD |  |
| RMSI CORESET RMC configuration |  | 1,4 | CR.1.1 FDD | N/A |
| 2 | CR.1.1 TDD |
| 3 | CR.2.1 TDD |
| Dedicated CORESET RMC configuration |  | 1,4 | CCR.1.1 FDD | N/A |
| 2 | CCR.1.1 TDD |
| 3 | CCR.2.1 TDD |
| OCNG Patterns |  | 1,2,3,4 | OP.1 | OP.1 |
| Initial BWP configuration |  | 1,2,3,4 | DLBWP.0.1 ULBWP.0.1 | N/A |
| PRS configuration |  | 1,4 | PRS.1.1 FR1 | PRS.1.1 FR1 |
| 2 | PRS.1.1 FR1 | PRS.1.1 FR1 |
| 3 | PRS.2.1 FR1 | PRS.2.1 FR1 |
| PRS Resource slot offset | slot | 1,2,3,4 | 0 | 4 |
| SRS configuration |  | 1,4 | POS-SRS.1 | N/A |
| 2 | POS-SRS.1 | N/A |
| 3 | POS-SRS.2 | N/A |
| Note 2 | dBm/SCS | 1,4 | -98 | |
| 2 | -98 | |
| 3 | -95 | |
| PRS | dB | 1,4 | -2.41 | -12.12 |
| 2 |
| 3 |
| PRS | dB | 1,4 | -2 | -10 |
| 2 |
| 3 |
| PRP Note 3 | dBm/SCS kHz | 1,4 | -100 | -108 |
|  | 2 | -100 | -108 |
|  | 3 | -97 | -105 |
| Io | dBm/9.36 MHz | 1,4 | -66.22 | -66.22 |
| dBm/9.36 MHz | 2 | -66.22 | -66.22 |
| dBm/18.72 MHz | 3 | -63.22 | -63.22 |
| Propagation Condition |  | 1,2,3,4 | AWGN | |

##### A.16.9.2.1.3 Test requirements

The UE Rx-Tx time difference measurement without RX FH fulfils the UE Rx-Tx measurement absolute accuracy requirements for AWGN propagation condition specified in the clause 10.1A.18.2 for both Cell 1 and Cell 2.

## **--- End of Change # 32 ---**

## **--- Start of Change # 33 ---**

#### A.16.9.2.2 SA: UE Rx-Tx time difference measurement accuracy TC with Rx FH in RRC\_INACTIVE state in FR1

##### A.16.9.2.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE Rx-Tx measurement accuracy in FR1 with FH by a RedCap UE in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clauses 10.1A.18.2.3 and 10.1A.18.2.4.

The supported test configurations in listed in Table A.16.9.2.2.1-1.

Table A.16.9.2.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

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

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test. The test requirements apply when *frequencyHopping* is configured to UE.

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

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

##### A.16.9.2.2.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.16.9.2.2.2-1.

Table A.16.9.2.2.2-1: UE Rx-Tx time difference test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | | Test 2 | |
|  |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| RF Channel Number |  | 1,2,3,4 | 1 | 1 | 1 | 1 |
| DRX | s | 1,2,3 | 1.28 | | 1.28 | |
| Time offset with Cell 1 | μs | 1, 2, 3, 4 | N/A | 3 | N/A | 3 |
| TDD configuration |  | 1, 4 | N/A | N/A | N/A | N/A |
|  | 2 | TDDConf.1.1 | TDDConf.1.1 | TDDConf.1.1 | TDDConf.1.1 |
|  |  | 3 | TDDConf.2.1 | TDDConf.2.1 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | N/A | SR.1.1 FDD | N/A |
|  | 2 | SR.1.1 TDD |  | SR.1.1 TDD |
|  | 3 | SR.2.1 TDD |  | SR.2.1 TDD |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | N/A | CR.1.1 FDD | N/A |
|  | 2 | CR.1.1 TDD | CR.1.1 TDD |
|  |  | 3 | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | N/A | CCR.1.1 FDD | N/A |
|  | 2 | CCR.1.1 TDD | CCR.1.1 TDD |
|  | 3 | CCR.2.1 TDD | CCR.2.1 TDD |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | OP.1 | OP.1 | OP.1 |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | N/A | DLBWP.0.1 ULBWP.0.1 | N/A |
| PRS configuration |  | 1, 4 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  |  | 2 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  |  | 3 | PRS.2.6 FR1 | PRS.2.6 FR1 | PRS.2.6 FR1 | PRS.2.6 FR1 |
| PRS Resource slot offset | slot | 1, 2, 3, 4 | 0 | 4 | 0 | 4 |
| SRS configuration |  | 1, 4 | POS-SRS.1 | N/A | POS-SRS.1 | N/A |
|  |  | 2 | POS-SRS.1 | N/A | POS-SRS.1 | N/A |
|  |  | 3 | POS-SRS.2 | N/A | POS-SRS.2 | N/A |
| Note 2 | dBm/SCS | 1 | -98 | | -98 | |
| 2 | -98 | | -98 | |
| 3 | -95 | | -95 | |
| 4 | -98 | | -98 | |
| Note 2 | dBm/15 kHz | 1 | -98 | | -98 | |
| 2 |
| 3 |
| 4 |
| PRS | dB | 1 | -2.41 | -12.12 | -2.41 | -12.12 |
| 2 |
| 3 |
| 4 |
| PRS | dB | 1 | -2 | -10 | -2 | -10 |
| 2 |
| 3 |
| 4 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -100 | -108 | -100 | -108 |
| 2 | -100 | -108 | -100 | -108 |
| 3 | -97 | -105 | -97 | -105 |
| 4 | -100 | -108 | -100 | -108 |
| Io | dBm/19.08 MHz | 1 | -64.57 | -64.57 | -64.57 | -64.57 |
| dBm/19.08 MHz | 2 | -64.57 | -64.57 | -64.57 | -64.57 |
| dBm/19.08 MHz | 4 | -64.57 | -64.57 | -64.57 | -64.57 |
| dBm/47.88 MHz | 3 | -60.59 | -60.59 | -60.59 | -60.59 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | AWGN | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.9.2.2.3 Test requirements

The UE Rx-Tx time difference measurement time fulfils the absolute and relative UE Rx-Tx measurement accuracy requirements specified in clause 10.1A.18.2 for both Cell 1 and Cell 2.

## **--- End of Change # 33 ---**

## **--- Start of Change # 34 ---**

A.16.9.3.1 PRS-RSRP measurement accuracy without FH in RRC\_INACTIVE state in FR1

A.16.9.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement in RRC\_INACTIVE without FH by a RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1A.17.2.1 for absolute accuracy and 10.1A.17.2.1 relative accuracy.

A.16.9.3.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.9.3.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in A.16.9.3.1.2-2. In all test cases, Cell 1 is the PCell. PRS RX hopping is not requested in *NR-DL-AoD-RequestLocationInformation*.

**Table A.16.9.3.1.2-1: PRS-RSRP supported test configurations**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

**Table A.16.9.3.1.2-2: PRS-RSRP test parameters**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | **Test 2** | | |
|  | | |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | |
| Cell ID | | |  | 489 | 0 | 489 | 0 | |
| SSB ARFCN | | |  | freq1 | | freq1 | | |
| Duplex mode | | Config 1,4 |  | FDD | | | | |
|  | | Config 2,3 |  | TDD | | | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | | |
| BWchannel | | Config 1,2,4 | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 3 |  | 20: NRB,c = 51 | | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | | |
| DRX Cycle | | | ms | 1280 | | | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | 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 1,4 |  | 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 1,4 |  | 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 1,4 |  | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | |
|  | | Config 2 |  | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | |
|  | | Config 3 |  | PRS.2.3 FR1 | PRS.2.3 FR1 | PRS.2.3 FR1 | PRS.2.3 FR1 | |
| PRS Resource slot offset (slot) | | Config 1,2,3,4 | slot | 0 | 4 | 0 | 4 | |
| SSB configuration | | Config 1,2,4 |  | SSB.1 FR1 | SSB.1 FR1 | SSB.1 FR1 | SSB.1 FR1 | |
|  | | Config 3 |  | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 | |
| Time offset with Cell 1 | | Config 1,4 | ms | - | 3 | - | 3 | |
|  | | Config 2,3 | μs | - | 3 | - | 3 | |
| SMTC configuration | | Config 1,2,3,4 |  | SMTC.1 RedCap | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | |
| 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 1,2,4 |  | dBm/15KhZ | -98 | | -98 | | |
| Config 3 |  | -98 | | -98 | | |
| Note2 | Config 1,2,4 | | 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, 2,4 |  | dBm/SCS | -100 | -108 | -100 | | -108 |
|  | Config 3 |  |  | -97 | -105 | -97 | | -105 |
| IoNote3 | Config 1,2,4 |  | dBm/9.36MHz | -67.67 | | -67.67 | | |
| Config 3 |  | dBm/18.36MHz | -64.75 | | -64.75 | | |
| Propagation condition | | |  | AWGN | | | | |
| Antenna configuration | | |  | 1x2 | | | | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | | |

A.16.9.3.1.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.2.

## **--- End of Change # 34 ---**

## **--- Start of Change # 35 ---**

A.16.9.3.2 PRS-RSRP measurement accuracy with FH in RRC\_INACTIVE state in FR1

A.16.9.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement in RRC\_INACTIVE with FH by a RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1A.17.2.1 for absolute accuracy and 10.1A.17.2.2 for relative accuracy.

A.16.9.3.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.9.3.2.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in A.16.9.3.2.2-2. In all test cases, Cell 1 is the PCell. PRS RX hopping is present in *NR-DL-AoD-RequestLocationInformation*.

**Table A.16.9.3.2.2-1: PRS-RSRP supported test configurations**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

**Table A.16.9.3.2.2-2: PRS-RSRP test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | **Test 2** | |
|  | | |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Cell ID | | |  | 489 | 0 | 489 | 0 |
| SSB ARFCN | | |  | freq1 | | freq1 | |
| Duplex mode | | Config 1,4 |  | FDD | | | |
|  | | Config 2,3 |  | TDD | | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | |
| BWchannel | | Config 1,2,4 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 20: NRB,c = 51 | | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | | |
| DRX Cycle | | | ms | 1280 | | | |
| PDSCH Reference measurement channel | | Config 1,4 |  | 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 1,4 |  | 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 1,4 |  | 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 1,4 |  | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  | | Config 2 |  | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 | PRS.1.5 FR1 |
|  | | Config 3 |  | PRS.2.6 FR1 | PRS.2.6 FR1 | PRS.2.6 FR1 | PRS.2.6 FR1 |
| PRS Resource slot offset (slot) | | Config 1,2,3,4 | slot | 0 | 4 | 0 | 4 |
| SSB configuration | | Config 1,2,4 |  | SSB.1 FR1 | SSB.1 FR1 | SSB.1 FR1 | SSB.1 FR1 |
|  | | Config 3 |  | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 |
| Time offset with Cell 1 | | Config 1,4 | ms | - | 3 | - | 3 |
|  | | Config 2,3 | μs | - | 3 | - | 3 |
| SMTC configuration | | Config 1,2,3,4 |  | SMTC.1 RedCap | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | |
| 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 1,2,4 |  | dBm/15KhZ | -98 | | -98 | |
| Config 3 |  | -98 | | -98 | |
| Note2 | Config 1,2,4 | | 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, 2,4 |  | dBm/SCS | -100 | -108 | -100 | -108 |
|  | Config 3 |  |  | -97 | -105 | -97 | -105 |
| IoNote3 | Config 1,2,4 |  | dBm/9.36MHz | -67.67 | | -67.67 | |
| Config 3 |  | dBm/18.36MHz | -64.75 | | -64.75 | |
| Propagation condition | | |  | AWGN | | | |
| Antenna configuration | | |  | 1x2 | | | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

A.16.9.3.2.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.2.

## **--- End of Change # 35 ---**

## **--- Start of Change # 36 ---**

#### A.16.9.4.1 PRS-RSRPP measurement accuracy TC without Rx FH in RRC\_INACTIVE state in FR1

##### A.16.9.4.1.1Test purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy in FR1 without FH by a RedCap UE in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clauses 10.1A.19.2.

##### A.16.9.4.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.9.4.1.2-1. Absolute accuracy of PRS-RSRPP measurements are tested by using the parameters in A.16.9.4.1.2-2. In all test cases, Cell 1 is the PCell and PRS RX hopping is not requested in *NR-DL-AoD-RequestLocationInformation*.

Table A.16.9.4.1.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations in each supported band. | |

Table A.16.9.4.1.2-2: PRS-RSRPP test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | |
|  | | |  | **Cell 1** | **Cell 2** |
| Cell ID | | |  | 489 | 0 |
| SSB ARFCN | | |  | freq1 | |
| Duplex mode | | Config 1,4 |  | FDD | |
|  | | Config 2,3 |  | TDD | |
| TDD configuration | | Config 1,4 |  | Not Applicable | |
|  | | Config 2 |  | TDDConf.1.1 | |
|  | | Config 3 |  | TDDConf.2.1 | |
| BWchannel | | Config 1,2,4 | MHz | 10: NRB,c = 52 | |
|  | | Config 3 |  | 20: NRB,c = 51 | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | |
| DRX Cycle | | | ms | 1280 | |
| PDSCH Reference measurement channel | | Config 1,4 |  | SR.1.1 FDD | - |
|  | | Config 2 |  | SR.1.1 TDD |  |
|  | | Config 3 |  | SR2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD | - |
|  | | Config 2 |  | CR.1.1 TDD |  |
|  | | Config 3 |  | CR2.1 TDD |  |
| Control channel RMC | | Config 1,4 |  | CCR.1.1 FDD | - |
|  | | Config 2 |  | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR2.1 TDD |  |
| PRS configuration | | Config 1,4 |  | PRS.1.3 FR1 | PRS.1.3 FR1 |
|  | | Config 2 |  | PRS.1.3 FR1 | PRS.1.3 FR1 |
|  | | Config 3 |  | PRS.2.3 FR1 | PRS.2.3 FR1 |
| PRS Resource slot offset (slot) | | Config 1,2,3,4 | slot | 0 | 4 |
| SSB configuration | | Config 1,2,4 |  | SSB.1 FR1 | SSB.1 FR1 |
|  | | Config 3 |  | SSB.1 RedCap FR1 | SSB.1 RedCap FR1 |
| Time offset with Cell 1 | | Config 1,4 | ms | - | 3 |
|  | | Config 2,3 | μs | - | 3 |
| SMTC configuration | | Config 1,2,3,4 |  | SMTC.1 RedCap | |
| OCNG Patterns | | |  | OCNG pattern 1 | |
| 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 1,2,4 |  | dBm/15KhZ | -98 | |
| Config 3 |  | -98 | |
| Note2 | Config 1,2,4 | | dBm/SCS | -98 | |
| Config 3 |  | -95 | |
|  | | | dB | -2.41 | -12.12 |
|  | | | dB | -2 | -10 |
| PRS-RSRP Note3 | Config 1, 2,4 |  | dBm/SCS | -100 | -108 |
|  | Config 3 |  |  | -97 | -105 |
| IoNote3 | Config 1,2,4 |  | dBm/9.36MHz | -67.67 | |
| Config 3 |  | dBm/18.36MHz | -64.75 | |
| Propagation condition | | |  | AWGN | |
| Antenna configuration | | |  | 1x2 | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | |

##### A.16.9.4.1.3 Test requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.19.2.

## **--- End of Change # 36 ---**

## **--- Start of Change # 37 ---**

#### A.16.9.4.2 SA: PRS-RSRPP measurement accuracy TC with Rx FH in RRC\_INACTIVE state in FR1

##### A.16.9.4.2.1Test purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy in FR1 with FH by a RedCap UE in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clauses 10.1A.19.2.

##### A.16.9.4.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.9.4.2.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in A.16.9.4.2.2-2. In all test cases, Cell 1 is the PCell and PRS RX hopping is requested in *NR-DL-AoD-RequestLocationInformation*.

Table A.16.9.4.2.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, UE bandwidth 20 MHz, Cell bandwidth 100 MHz, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, UE bandwidth 10 MHz, Cell bandwidth 50 MHz, HD-FDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations in each supported band. | |

Table A.16.9.4.2.2-2: PRS-RSRPP test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | Cell 2 | |
|  | | |  |
| Cell ID | | |  | 489 | | 0 |
| SSB ARFCN | | |  | freq1 | | |
| Duplex mode | | Config 1,4 |  | FDD | | |
|  | | Config 2,3 |  | TDD | | |
| TDD configuration | | Config 1,4 |  | Not Applicable | | |
|  | | Config 2 |  | TDDConf.1.1 | | |
|  | | Config 3 |  | TDDConf.2.1 | | |
| BWchannel | | Config 1,2,4 | MHz | 10: NRB,c = 52 | | |
|  | | Config 3 |  | 20: NRB,c = 51 | | |
| Downlink initial BWP configuration | | |  | DLBWP.0.1 | | |
| Uplink initial BWP configuration | | |  | ULBWP.0.1 | | |
| TRS configuration | | Config 1,4 |  | 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 1,4 |  | SR.1.1 FDD | | - |
|  | | Config 2 |  | SR.1.1 TDD | |  |
|  | | Config 3 |  | SR2.1 TDD | |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD | | - |
|  | | Config 2 |  | CR.1.1 TDD | |  |
|  | | Config 3 |  | CR2.1 TDD | |  |
| Control channel RMC | | Config 1,4 |  | CCR.1.1 FDD | | - |
|  | | Config 2 |  | CCR.1.1 TDD | |  |
|  | | Config 3 |  | CCR2.1 TDD | |  |
| PRS configuration | | Config 1,4 |  | PRS.1.5 FR1 | | PRS.1.5 FR1 |
|  | | Config 2 |  | PRS.1.5 FR1 | | PRS.1.5 FR1 |
|  | | Config 3 |  | PRS.2.6 FR1 | | PRS.2.6 FR1 |
| PRS Resource slot offset (slot) | | Config 1,2,3,4 | slot | 0 | | 4 |
| SSB configuration | | Config 1,2,4 |  | SSB.1 FR1 | | SSB.1 FR1 |
|  | |  |  |  | |  |
|  | | Config 3 |  | SSB.1 RedCap FR1 | | SSB.1 RedCap FR1 |
| Time offset with Cell 1 | | Config 1,4 | ms | - | | 3 |
|  | | Config 2,3 | μs | - | | 3 |
| SMTC configuration | | Config 1,2,3,4 |  | SMTC.1 RedCap | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | |
| 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 1,2,4 |  | dBm/15KhZ | -98 | | |
| Config 3 |  | -98 | | |
| Note2 | Config 1,2,4 | | dBm/SCS | -98 | | |
| Config 3 |  | -98 | | |
|  | | | dB | -2.41 | | -12.12 |
|  | | | dB | -2 | | -10 |
| PRS-RSRP Note3 | Config 1, 2,4 |  | dBm/SCS | -100 | | -108 |
|  | Config 3 |  |  | -97 | | -105 |
| IoNote3 | Config 1,2,4 |  | dBm/19.08MHz | -67.67 | | |
| Config 3 |  | dBm/47.88MHz | -64.75 | | |
| Propagation condition | | |  | Two-tap channel Note 6 | | |
| 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 6: 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.16.9.4.2.3 Test requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.19.2..

## **--- End of Change # 37 ---**

## **--- Start of Change # 38 ---**

#### A.16.10.1.1 NR RSTD measurement reporting delay test case for RedCap UE without FH in FR1 SA in RRC\_IDLE state without eDRX

##### A.16.10.1.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC IDLE state and without eDRX meets the requirements specified in Clause 4.6.2.5 in an environment with AWGN propagation conditions in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.16.10.1.1.1-1.

Table A.16.10.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All 3 cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2 and Cell 3. During T2 UE shall be in RRC\_IDLE state and all three cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the RedCap UE during T1. The measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The last TTI containing the two messages shall be provided to the RedCap UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request. The beginning of the time interval T2 shall be aligned with the first DRX cycle containing a DL PRS resource(s).

The UE is configured with DRX cycle of 1.28 s.

The general test parameters are listed in Table A.16.10.1.1.1-2, and cell specific test parameters are listed in Table A.16.10.1.1.1-3 and Table A.16.10.1.1.1-4.

Table A.16.10.1.1.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| SSB configuration | Config 1 |  | SSB.1 FR1 |  |
| Config 2 |  | SSB.1 FR1 |
| Config 3 |  | SSB.1 RedCap FR1 |
| Config 4 |  | SSB.1 FR1 |
| SMTC configuration | Config 1 |  | SMTC.2 |  |
| Config 2 |  | SMTC.1 |
| Config 3 |  | SMTC.1 |
| Config 4 |  | SMTC.2 |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| Config 2 |  | SR.1.1 TDD |
| Config 3 |  | SR.2.1 TDD |
| Config 4 |  | SR.1.1 FDD |
| RMSI CORESET RMC configuration | Config 1 |  | CR.1.1 FDD | As specified in clause A.3.1.2 |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Config 4 |  | CR.1.1 FDD |
| Dedicated CORESET RMC configuration | Config 1 |  | CCR.1.1 FDD |  |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| Config 4 |  | CCR.1.1 FDD |
| Initial BWP configuration | Config 1,2,3,4 |  | DLBWP.0.1  ULBWP.0.1 |  |
| Active UL BWP configuration | Config 1,2,3,4 |  | ULBWP.1.1 |  |
| PRS Configuration | Config 1 |  | PRS.1.1 FR1 | As specified in clause A.3.31 |
| Config 2 |  | PRS.1.1 FR1 |
| Config 3 |  | PRS.2.1 FR1 |
| Config 4 |  | PRS.1.1 FR1 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | | s | 1.28 |  |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance ta specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 4 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [34] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 5 | The length of the time interval that follows immediately after time interval T1. |

Table A.16.10.1.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -98 | | |
| Config 2 | dBm/SCS | -98 | | |
| Config 3 | dBm/SCS | -95 | | |
| Config 4 | dBm/SCS | -98 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| SSB | | dB | 10 | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| Config 2 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| Config 3 | dBm/  18.36MHz | -56.71 | -56.71 | -56.71 |
| Config 4 | dBm/  9.36MHz | -59.63 | -59.63 | -59.63 |
| SSB RP Note4 | Config 1 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 2 | dBm/SCS | -88 | -Infinity | -Infinity |
| Config 3 | dBm/SCS | -85 | -Infinity | -Infinity |
| Config 4 | dBm/SCS | -88 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.16.10.1.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 | FR1 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -98 | -98 | -98 |
| Config 2 | dBm/SCS | -98 | -98 | -98 |
| Config 3 | dBm/SCS | -95 | -95 | -95 |
| Config 4 | dBm/SCS | -98 | -98 | -98 |
| PRS | Config 1 | dB | -5.45 | -11.67 | -11.67 |
| Config 2 | dB | -5.45 | -11.67 | -11.67 |
| Config 3 | dB | -5.45 | -11.67 | -11.67 |
| Config 4 | dB | -5.45 | -11.67 | -11.67 |
| Io Note 4 | Config 1 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| Config 2 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| Config 3 | dBm/  18.36MHz | -65.61 | -65.61 | -65.61 |
| Config 4 | dBm/  9.36MHz | -68.52 | -68.52 | -68.52 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cells (all, except Cell 3 in T2) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

##### A.16.10.1.1.2 Test Requirements

The RSTD measurement time without FH for RedCap fulfils the requirements specified in Clause 4.6.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 4.6.2.5 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 each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD1970049.

## **--- End of Change # 38 ---**

## **--- Start of Change # 39 ---**

#### A.16.10.2.1 PRS-RSRP reporting delay test case for single positioning frequency layer in RRC\_IDLE

##### A.16.10.2.1.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRP measurement without RX FH in RRC\_IDLE in FR1 meets the delay requirements specified in clause 4.6.3.5 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.16.10.2.1.1-1.

Table A.16.10.2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations in each supported band. | |

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. In the DL slot next to slot #n, UE is released into RRC\_IDLE. PRS RX FH is not requested in *NR-DL-AoD-RequestLocationInformation*.

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

The general test parameters are listed in Table A.16.10.2.1.1-2, and cell specific test parameters are listed in Table A.16.10.2.1.1-3.

Table A.16.10.2.1.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Reference cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1, 2, 4 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 2, 4 | SSB.1 FR1 |  |
|  |  | 3 | SSB.1 RedCap FR1 |  |
| SMTC configuration |  | 1, 2, 3, 4 | SMTC.1 RedCap |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX |  | 1, 2, 3, 4 | 1.28s |  |
| Time offset between serving and neighbour cells | ms | 1, 2, 3, 4 | 3 | Synchronous cells |
| Expected RSTD | ms | 1, 2, 3, 4 | 3 |  |
| Expected RSTD uncertainty | ms | 1, 2, 3, 4 | 5 |  |
| T1 | s | 1, 2, 3, 4 | 2 |  |
| T2 | s | 1, 2, 3, 4 | 6 |  |

Table A.16.10.2.1.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1, 4 | N/A | | N/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | | N/A | |
|  | 2 | SR.1.1 TDD | |  | |
|  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | | N/A | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | | N/A | |
|  | 2 | CCR.1.1 TDD | |
|  | 3 | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | | OP.1 | |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | | N/A | |
| PRS configuration |  | 1, 4 | PRS.1.3 FR1 | | PRS.1.3 FR1 | |
|  | 2 | PRS.1.3 FR1 | | PRS.1.3 FR1 | |
|  | 3 | PRS.2.3 FR1 | | PRS.2.3 FR1 | |
| PRS muting info |  | 1, 2, 3, 4 | ‘10’ | | ‘01’ | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  | 2 | -98 | | | |
|  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  | 2 |  | | | |
|  | 3 |  | | | |
| PRS | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/9.36 MHz | 1, 4 | N/A | -66.22 | N/A | -66.22 |
|  | dBm/9.36 MHz | 2 | -66.22 | -66.22 |
|  | dBm/18.72 MHz | 3 | -63.22 | -63.22 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN | | | |
| NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: SS-RSRP/PRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.16.10.2.1.2 Test Requirements

The UE shall perform and report the PRS-RSRP measurements for Cell 1 and Cell 2, within the time limit specified in clause 4.6.3.5, 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%, where the reported PRS-RSRP measurement for each correct event shall be within the reporting range specified in clause 10.1A.17.3.

## **--- End of Change # 39 ---**

## **--- Start of Change # 40 ---**

#### A.16.11.1.1 RSTD measurement accuracy test case for RedCap UE without FH in FR1 in RRC\_IDLE state without eDRX

##### A.16.11.1.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC\_IDLE state and without eDRX meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.16.11.1.1.1-1.

Table A.16.11.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD 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 UE is configured with DRX cycle of 1.28 s. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the RedCap UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 4.6.2.5.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

Table A.16.11.1.1.1-2: RSTD accuracy test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| PRS ARFCN | 1,2,3,4 |  | freq1 | Freq1 |
| BWchannel | 1 | MHz | 10: NRB,c = 52 | |
| 2 | 10: NRB,c = 52 | |
| 3 | 20: NRB,c = 51 | |
| 4 | 10: NRB,c = 52 | |
| Duplex mode | 1 |  | FDD | |
| 2 | TDD | |
| 3 | TDD | |
| 4 | HD-FDD | |
| TDD configuration | 1 |  | N/A | |
| 2 | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | |
| 4 | N/A | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - |
| 2 | SR.1.1 TDD |  |
| 3 | SR.2.1 TDD |  |
| 4 | SR.1.1 FDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - |
| 2 | CR.1.1 TDD | - |
| 3 | CR.2.1 TDD | - |
| 4 | CR.1.1 FDD |  |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - |
| 2 | CCR.1.1 TDD | - |
| 3 | CCR.2.1 TDD | - |
| 4 | CCR.1.1 FDD | - |
| SSB configuration | 1 |  | SSB.1 FR1 | |
| 2 | SSB.1 FR1 | |
| 3 | SSB.1 RedCap FR1 | |
| 4 | SSB.1 FR1 | |
| OCNG Patterns | 1,2,3,4 |  | OP.1 | |
| TRS configuration | 1 |  | TRS.1.1 FDD | - |
| 2 | TRS.1.1 TDD |  |
| 3 | TRS.1.2 TDD |  |
| 4 | TRS.1.1 FDD |  |
| Initial BWP Configuration | 1,2,3,4 |  | DLBWP.0.1  ULBWP.0.1 | |
| Time offset with Cell 1 | 1,2,3,4 | μs | - | 3 |
| 2,3 | - | 3 |
| SMTC configuration | 1,4 |  | SMTC.2 | |
| 2,3 | SMTC.1 | |
| PRS configuration | 1 |  | PRS.1.3 FR1 | |
| 2 | PRS.1.3 FR1 | |
| 3 | PRS.2.3 FR1 | |
| 4 | PRS.1.3 FR1 | |
| PRS muting info | 1,2,3,4 |  | ‘10’ | ‘01’ |
| Expected RSTD | 1,2,3,4 | μs | N/A | 3 |
| Expected RSTD uncertainty | 1,2,3,4 | μs | N/A | 5 |
| EPRE ratio of PSS to SSS | 1,2,3,4 | 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 |
| Note2 | 1,2,4 | dBm/ SCS | -98 | |
| 3 | -95 | |
|  | 1,2,3,4 | dB | -6 | -13 |
| PRS-RSRPNote3 | 1,2,4 | dBm/SCS | -103.7 | -109.9 |
| 3 | -100.7 | -106.9 |
| IoNote3 | 1,2,3,4 | dBm/  9.36MHz | -68.8 | -68.8 |
| 3 | dBm/  18.36MHz | -65.88 | -65.88 |
|  | 1,2,3,4 | dB | -5.7 | -11.9 |
| Propagation condition | 1,2,3,4 | - | AWGN | |
| Antenna configuration | 1,2,3,4 |  | 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: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

##### A.16.11.1.1.2 Test Requirements

The RSTD measurement accuracy shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 40 ---**

## **--- Start of Change # 41 ---**

#### A.16.11.2.1 PRS-RSRP measurement accuracy test case for RedCap UE in FR1 in RRC\_IDLE state

##### A.16.11.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRP measurement accuracy for 1Rx RedCap UE and 2Rx RedCap UE, respectively, in RRC\_IDLE is within the specified limits in FR1. This test will verify the requirements in clauses 10.1A.17.2.1 for absolute accuracy and 10.1A.17.2.2 for relative accuracy, when the PRS-RSRP measurement is performed without RX FH.

##### A.16.11.2.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.16.11.2.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in A.16.11.2.1.2-2. In all test cases, Cell 1 is the PCell.

Table A.16.11.2.1.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations in each supported band. | |

Table A.16.11.2.1.2-2: PRS-RSRP test parameters

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Test 1 | | Test 2 | | |
|  | | | |  | Cell 1 | Cell 2 | Cell 1 | Cell 2 | |
| Cell ID | | | |  | 489 | 0 | 489 | 0 | |
| SSB ARFCN | | | |  | freq1 | | freq1 | | |
| Duplex mode | | | Config 1 |  | FDD | | | | |
|  | | | Config 2,3 |  | TDD | | | | |
| Config 4 | HD-FDD | | | | |
| TDD configuration | | | Config 1,4 |  | Not Applicable | | | | |
|  | | | Config 2 |  | TDDConf.1.1 | | | | |
|  | | | Config 3 |  | TDDConf.2.1 | | | | |
| BWchannel | | | Config 1,4 | MHz | 10: NRB,c = 52 | | | | |
|  | | | Config 2 |  | 10: NRB,c = 52 | | | | |
|  | | | Config 3 |  | 20: NRB,c = 51 | | | | |
| BWP BW | | | Config 1,4 |  | 10: NRB,c = 52 | | | | |
|  | | | Config 2 |  | 10: NRB,c = 52 | | | | |
|  | | | Config 3 |  | 20: NRB,c = 51 | | | | |
| Downlink initial BWP configuration | | | |  | DLBWP.0.1 | | | | |
| Uplink initial BWP configuration | | | |  | ULBWP.0.1 | | | | |
| CP length | | Config 1,2,3,4 | |  | Normal | | | | |
| DRX Cycle | | Config 1,2,3,4 | | s | 1.28 | | | | |
| PDSCH Reference measurement channel | | | Config 1,4 |  | 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 1,4 |  | 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 1,4 |  | 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 1,4 |  | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | |
|  | | | Config 2 |  | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | PRS.1.3 FR1 | |
|  | | | Config 3 |  | PRS.2.3 FR1 | PRS.2.3 FR1 | PRS.2.3 FR1 | PRS.2.3 FR1 | |
| PRS Resource slot offset (slot) | | | Config 1,2,3,4 | slot | 0 | 4 | 0 | 4 | |
| SSB configuration | | | Config 1,4 |  | 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.1  RedCap FR1 | SSB.1  RedCap FR1 | SSB.1  RedCap FR1 | SSB.1  RedCap FR1 | |
| Time offset with Cell 1 | | | Config 1,4 | ms | - | 3 | - | 3 | |
|  | | | Config 2,3 | μs | - | 3 | - | 3 | |
| SMTC configuration | | | Config 1,4 |  | SMTC.1 RedCap | | | | |
| Config 2,3 |  | SMTC.1 RedCap | | | | |
| OCNG Patterns | | Config 1,2,3,4 | |  | OCNG pattern 1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | | Config 1,2,4 | 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 1,2,4 | | | dBm/15kHz | -98 | | -98 | | |
| Config 3 | | | -98 | | -98 | | |
| Note2 | Config 1,2,4 | | | 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 1,2,4 | | | dBm/SCS | -100 | -108 | -100 | | -108 |
|  | Config 3 | | | -97 | -105 | -97 | | -105 |
| IoNote3 | Config 1,2,4 | | | dBm/9.36MHz | -66.22 | | -66.22 | | |
| Config 3 | | | dBm/18.72MHz | -63.22 | | -63.22 | | |
| Propagation condition | | | |  | AWGN | | | | |
| Antenna configuration (1Rx RedCap UE) | | | |  | 1x1 | | | | |
| Antenna configuration (2Rx RedCap UE) | | | |  | 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 sub-carriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | | | |

##### A.16.11.2.1.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1 when the PRS-RSRP measurement is performed without RX FH. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.2 when the PRS-RSRP measurement is performed without RX FH.

## **--- End of Change # 41 ---**

## **--- Start of Change # 42 ---**

#### A.17.6.5.1 NR RSTD measurement reporting delay test case for RedCap UE without FH in FR2 SA

##### A.17.6.5.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC CONNECTED state meets the requirements specified in Clause 9.9A.2 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

Supported test configurations are shown in table A.17.6.5.1.1-1. The test parameters are as given in Table A.17.6.5.1.1-2, Table A.17.6.5.1.1-3, and Table A.17.6.5.1.1-4.

Table A.17.6.5.1.1-1: Supported test configurations for NR RSTD

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

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

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

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

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the RedCap UE during T1. The measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The last TTI containing the two messages shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

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

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

Table A.17.6.5.1.1-2: General test parameters for RSTD measurement reporting delay

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

Table A.17.6.5.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| BWchannel | | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | N/A | N/A |
| EPRE ratio of PSS to SSS | | dB | 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) | |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -57 | -57 | -57 |
| SSB\_RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
| SSB | Config 1 | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  NOTE 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 4: SSB\_RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.17.6.5.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| BWchannel | | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| EPRE ratio of PRS to SSS | |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.45 | -11.67 | -11.67 |
| Io Note4 | Config 1 | dBm/  95.04MHz | -58.49 | -58.49 | -58.49 |
| PRS | | dB | -6 | -13 | -13 |
| PRP Note 4 | | dBm/SCS | -94.45 | -100.67 | -100.67 |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  NOTE 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 4: PRP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. The Io is calculated based only on the symbols in which PRS is transmitted.  NOTE 5: 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.17.6.5.1.2 Test Requirements

The RSTD measurement time without FH for RedCap fulfils the requirements specified in Clause 9.9A.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.2A.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 each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

## **--- End of Change # 42 ---**

## **--- Start of Change # 43 ---**

#### A.17.6.5.2 NR RSTD measurement reporting delay test case with PRS frequency hopping

##### A.17.6.5.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9A.2.6 in FR2 in standalone scenario when PRS frequency hopping is configured.

Supported test configurations are shown in table A.17.6.5.2.1-1. The test parameters are as given in Table A.17.6.5.2.1-2, Table A.17.6.5.2.1-3, and Table A.17.6.5.2.1-4.

Table A.17.6.5.2.1-1: Supported test configurations for NR RSTD

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

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

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

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

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

The test requirements apply when *frequencyHopping* is configured to UE.

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

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

Table A.17.6.5.2.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| SSB configuration | Config 1 |  | SSB.1 RedCap FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 RedCap |  |
| PDSCH RMC configuration | Config 1 |  | SR.3.2 TDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD |  |
| Dedicated CORESET RMC configuration | Config 1 |  | CCR.3.1 TDD |  |
| PRS Configuration | Config 1 |  | PRS.1.6 FR2 | PRS configured with frequency hopping as specified in clause A.3.31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| Measurement gap | |  | GP#24 or GP#13 | GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.17.6.5.2.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| BWchannel | | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -57.00 | -57.00 | -57.00 |
| SSB\_RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
| SSB | Config 1 | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  NOTE 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 4: SSB\_RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.17.6.5.2.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| BWchannel | | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.44 | -11.67 | -11.67 |
| Io Note4 | Config 1 | dBm/  95.04MHz | -58.48 | -58.48 | -58.48 |
| PRS | | dB | -6 | -13 | -13 |
| PRP Note 4 | | dBm/SCS | -94 | -101 | -101 |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  NOTE 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 4: PRP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. The Io is calculated based only on the symbols in which PRS is transmitted.  NOTE 5: 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.17.6.5.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9A.2.6.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9A.2.6 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

## **--- End of Change # 43 ---**

## **--- Start of Change # 44 ---**

#### A.17.6.6.2 UE Rx-Tx time difference measurement with Rx FH for single positioning frequency layer in FR2 SA in RRC\_CONNECTED state

##### A.17.6.6.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement with Rx FH meets the requirements specified in clause 9.9A.4.8 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are listed in Table A.17.6.6.2.1-1.

Table A.17.6.6.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

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

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

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

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

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

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.17.6.6.2.1-2 and Table A.17.6.6.2.1-3, respectively.

Table A.17.6.6.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.3 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 1 |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | OFF |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| PRS RX hopping request |  | 1 | requested |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 10 |  |
| NOTE 1: GP#24 is configured if RedCap UE supports MG#24, otherwise GP#13 is configured. | | | | |

Table A.17.6.6.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1  ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 RedCap | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 RedCap | | N/A | |
| PRS configuration |  | 1 | PRS.1.6 FR2 | | PRS.1.6 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/190.08 MHz | 1 | N/A | -54.62 | N/A | -54.62 |
| Propagation Condition |  | 1 | AWGN | | | |
| NOTE 1: 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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  NOTE 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  NOTE 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  NOTE 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.17.6.6.2.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9A.4.8.

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

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 each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1A.18.3.

## **--- End of Change # 44 ---**

## **--- Start of Change # 45 ---**

#### A.17.6.7.1 PRS-RSRP measurement delay test case for RedCap positioning without Rx FH in RRC\_CONNECTED state in FR2

##### A.17.6.7.1.1 PRS-RSRP measurement delay test case for single positioning frequency layer

###### A.17.6.7.1.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements specified in Clause 9.9.3.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.17.6.7.1.1.1-1.

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 measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform PRS-RSRP measurement with RX FH via *NR-DL-AoD-RequestLocationInformation* or the UE is configured by the LMF to perform PRS-RSRP measurement with RX FH but reports the PRS-RSRP measurement based on the single hop in *NR-DL-AoD-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

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

The test parameters are as given in table A.17.6.7.1.1.1-2 and table A.17.6.7.1.1.1-3.

Table A.17.6.7.1.1.1-1: supported test configurations for PRS RSRP measurement for FR2.

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

Table A.17.6.7.1.1.1-2: General test parameters for PRS RSRP measurement reporting delay

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

Table A.17.6.7.1.1.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | 1 | Rough | | Rough | |
| TDD configuration | |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | 1 | TDD | | TDD | |
| BWchannel | | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | 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) | |  | 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 120 | | 120 | |
| PRS configuration | |  | 1 | PRS.1.1 FR2 | | PRS.1.1 FR2 | |
| PRS muting configuration | |  | 1 | ‘10’ | | ‘01’ | |
| EPRE ratio of PSS to SSS | | dB |  |  | |  | |
| 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 | | 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 | 1 | -89 | | -89 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | 1 | -91 | -91 | -Infinity | -99 |
| PRP Note 3 | | dBm/SCS Note5 | 1 | -Infinity | -91 | -Infinity | -99 |
| PRS | | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| SSB | | dB | 1 | -2 | -2 | -Infinity | -10 |
| IoNote3 | | dBm/95.04 MHz Note5 | 1 | -57.89 | -57.63 | -57.89 | -57.63 |
| Propagation Condition | |  | 1 | AWGN | | | |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: SSB\_RP/PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  NOTE 6: As observed with 0 dBi gain antenna at the centre of the quiet zone.  NOTE 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  NOTE 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

###### A.17.6.7.1.1.2 Test Requirements

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

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 RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1A.17.3.

## **--- End of Change # 45 ---**

## **--- Start of Change # 46 ---**

##### A.17.6.7.1.2 PRS-RSRP measurement delay test case for dual positioning frequency layer

###### A.17.6.7.1.2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements specified in Clause 9.9.3.5 for dual positioning frequency layers under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.17.6.7.1.2.1-1.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the different frequency from 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 DT after slot #n, where DT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.17.6.7.1.2.1-2, and table A.17.6.7.1.2.1-3.

Table A.17.6.7.1.2.1-1: supported test configurations for PRS RSRP measurement for FR2

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

Table A.17.6.7.1.2.1-2: General test parameters for PRS RSRP measurement reporting delay

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

Table A.17.6.7.1.2.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | 1 | Rough | | Rough | |
| NR RF Channel Number | |  | 1 | 1 | | 2 | |
| TDD configuration | |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | 1 | TDD | | TDD | |
| BWchannel | | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | 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) | |  | 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 120 | | 120 | |
| PRS configuration | |  | 1 | PRS.1.1 FR2 | | PRS.1.2 FR2 | |
| PRS muting configuration | |  | 1 | ‘10’ | | ‘01’ | |
| EPRE ratio of PSS to SSS | | dB |  |  | |  | |
| 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 | | 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 | 1 | -89 | | -89 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | 1 | -92 | -92 | -Infinity | -102 |
| PRP Note 3 | | dBm/SCS Note5 | 1 | -Infinity | -92 | -Infinity | -102 |
| PRS | | dB | 1 | -Infinity | -3 | -Infinity | -13 |
| PRS | | dB | 1 | -Infinity | -3 | -Infinity | -13 |
| SSB | | dB | 1 | -3 | -3 | -Infinity | -13 |
| IoNote3 | | dBm/95.04 MHz Note5 | 1 | -58.25 | -58.25 | -60.01 | -59.80 |
| Propagation Condition | |  | 1 | AWGN | | | |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: SSB\_RP/PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 6: As observed with 0 dBi gain antenna at the centre of the quiet zone.  NOTE 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  NOTE 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

###### A.17.6.7.1.2.2 Test Requirements

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

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 RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1A.17.3.

## **--- End of Change # 46 ---**

## **--- Start of Change # 47 ---**

#### A.17.6.7.2 PRS-RSRP measurement delay with FH in RRC\_CONNECTED state in FR2

##### A.17.6.7.2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement with FH by a RedCap UE meets requirements specified in Clause 9.9A.3.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.17.6.7.2.1-1

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 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.17.6.7.2.1-2, and table A.17.6.7.2.1-3.

Table A.17.6.7.2.1-1: supported test configurations for PRS RSRP measurement for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

Table A.17.6.7.2.1-2: General test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| Gap Pattern Id |  | Config 1 | GP#13 or GP#24Note1 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| CP length |  | Config 1 | Normal |  |
| 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 |  |
| PRS RX hopping request |  | Config 1 | Present |  |
| 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.17.6.7.2.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | Rough | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP 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.1.6 FR2 | | PRS.1.6 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 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1 | -91 | -91 | -Infinity | -99 |
| PRP 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 |
| SSB | | dB | Config 1 | -2 | -2 | -Infinity | -10 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -60.01 | -57.63 | -60.01 | -57.63 |
| Propagation Condition | |  | Config 1 | AWGN | | | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: 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: SSB\_RP/PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 6: As observed with 0 dBi gain antenna at the centre of the quiet zone.  NOTE 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  NOTE 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

##### A.17.6.7.2.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9A.3.5. The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9A.3.5 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 RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1A.17.3Y, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

## **--- End of Change # 47 ---**

## **--- Start of Change # 48 ---**

#### A.17.6.8.1 PRS-RSRPP measurement delay without FH in RRC\_CONNECTED state in FR2

##### A.17.6.8.1.1 Test Purpose and Environment

The purpose of the test is to verify that the PRS RSRPP measurement without FH by a RedCap UE meets requirements specified in Clause 9.9A.5.5 for single positioning frequency layer under 2-tap channel propagation conditions in standalone scenario. Supported test configurations are shown in table A.17.6.8.1.1-1.

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.17.6.8.1.1-2, and table A.17.6.8.1.1-3.

**Table A.17.6.8.1.1-1: supported test configurations for PRS RSRPP measurement for FR2**

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

**Table A.17.6.8.1.1-2: 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 (PVell) | 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 |
| CP length |  | Config 1 | Normal |  |
| 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 |  |
| PRS RX hopping request |  | 1, 2, 3, 4 | NOT present |  |
| 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.17.6.8.1.1-3: 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.3.1 TDD | | - | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | - | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| PRS configuration | |  | Config 1 | PRS.1.3 FR2 | | PRS.1.3 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/95.04 MHz Note5 | Config 1 | -60.01 | -57.63 | -60.01 | -57.63 |
| 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 active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: 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.17.6.8.1.2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 9.9A.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 9.9A.5.5 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 10.1A.19, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

## **--- End of Change # 48 ---**

## **--- Start of Change # 49 ---**

#### A.17.6.8.2 PRS-RSRPP measurement with Rx FH reporting delay test case for single positioning frequency layer in FR2 SA in RRC\_CONNECTED state

##### A.17.6.8.2.1 Test Purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement requirements with Rx FH in RRC\_CONNECTED state meets the delay requirements specified in Clause 9.9A.5.8 in an environment with two-tap channel propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.17.6.8.2.1-1.

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 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.17.6.8.2.1-2, and table A.17.6.8.2.1-3.

**Table A.17.6.8.2.1-1: supported test configurations for PRS-RSRPP measurement for FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

**Table A.17.6.8.2.1-2: 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. |
| PRS RX hopping request |  | 1 | requested |  |
| 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.17.6.8.2.1-3: 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1  RedCap | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1  RedCap | | 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.1.6 FR2 | | PRS.1.6 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.17.6.8.2.2 Test Requirements

The PRS-RSRPP measurement time fulfils the requirements specified in Clause 9.9A.5.8. 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 9.9A.5.8 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 10.1A.19, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

## **--- End of Change # 49 ---**

## **--- Start of Change # 50 ---**

#### A.17.7.5.1 RSTD measurement accuracy test case for RedCap UE without FH

##### A.17.7.5.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC CONNECTED state meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.17.7.5.1.1-1.

Table A.17.7.5.1.1-1: Supported test configurations

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

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 cells. Both cells are on the same NR RF channel in FR2. GP#24 is configured if UE supports GP#24, otherwise, GP#13 is configured for the test. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the RedCap UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 9.9A.2.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The accuracy test parameters and OTA related test parameters are as given in Table A.17.7.5.1.1-2 and Table A.17.7.5.1.1-3, respectively.

Table A.17.7.5.1.1-2: RSTD accuracy test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| PRS ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | |
| Measurement gap |  | GP#24 or GP#13 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS Resource slot offset | slot | 0 | 4 |
| Expected RSTD | μs | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| EPRE ratio of PRS to SSS | dB | 0 | 0 |
| Propagation conditions |  | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS. | | | |

Table A.17.7.5.1.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 5 |  | Rough | |
| Note1 | dBm/SCSNote3 | -89 | |
| PRS | dB | -5.7 | -11.9 |
| PRPNote2 | dBm/SCS | -94.7 | -100.9 |
| PRS | dB | -6 | -13 |
| IoNote2 | dBm/95.04 MHz Note3 | -58.76 | -58.76 |
| 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: PRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The Io is calculated based only on the symbols in which PRS is transmitted.  NOTE 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4.  NOTE 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | |

##### A.17.7.5.1.2 Test Requirements

The RSTD measurement accuracy shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 50 ---**

## **--- Start of Change # 51 ---**

A.17.7.5.2 RSTD measurement accuracy test case for RedCap UE with FH in RRC\_CONNECTED state

A.17.7.5.2.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.17.7.5.2.1-1. The test parameters are as given in Table A.17.7.5.2.1-2, Table A.17.7.5.2.1-3, and Table A.17.7.5.2.1-4.

**Table A.17.7.5.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

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 cells. Both cells are on the same NR RF channel in FR2. GP#24 is configured if UE supports GP#24, otherwise, GP#13 is configured for the test. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* as specified in TS 37.355 [34, clause 6.5.12]. The frequency hopping configurations are specified in clause A.3.31.

**Table A.17.7.5.2.1-2: RSTD accuracy test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** |
|  |  |
| PRS ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | |
| Measurement gap |  | GP#24 or GP#13 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - |
| Downlink dedicated BWP configuration |  | DLBWP.1.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - |
| DRX cycle configuration |  | Not applicable | - |
| TRS configuration |  | TRS.2.1 TDD | - |
| TCI state |  | TCI.State.0 | - |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - |
| Control channel RMC |  | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| PRS configuration |  | PRS.1.6 FR2 | PRS.1.6 FR2 |
| PRS Resource slot offset | slot | 0 | 4 |
| Expected RSTD | μs | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| EPRE ratio of PRS to SSS | dB | 0 | 0 |
| Propagation conditions |  | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS. | | | |

**Table A.17.7.5.2.1-3: RSTD accuracy OTA related test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** |
|  |  |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 5 |  | Rough | |
| Note1 | dBm/SCSNote3 | -89 | |
| PRS | dB | -5.7 | -11.9 |
| PRPNote2 | dBm/SCS | -94.7 | -100.9 |
| PRS | dB | -6 | -13 |
| IoNote2 | dBm/190.08 MHz Note3 | -55.75 | -55.75 |
| NOTE 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 2: PRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The Io is calculated based only on the symbols in which PRS is transmitted.  NOTE 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4.  NOTE 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | |

A.17.7.5.2.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 51 ---**

## **--- Start of Change # 52 ---**

#### A.17.7.6.2 SA: UE Rx-Tx time difference measurement accuracy TC with Rx FH in RRC\_CONNECTED state in FR2

##### A.17.7.6.2.1 Test purpose and Environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy with FH by a RedCap UE in RRC\_CONNECTED is within the specified limits. This test will verify the requirements in clause 10.1A.18.2.3 and 10.1A.18.2.4. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configuration is listed in Table A.17.7.6.2.1-1.

Table A.17.7.6.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

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

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test. The test requirements apply when *frequencyHopping* is configured to UE.

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

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

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

##### A.17.7.6.2.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.17.7.6.2.2-1.

Table A.17.7.6.2.2-1: UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | | Test 2 | |
|  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 |  | 1 | Rough | Rough | Rough | Rough |
| Measurement gap |  | 1 | GP#24 or GP#13 Note 8 | | GP#24 or GP#13 Note 8 | |
| DRX |  | 1 | OFF | | OFF | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 | N/A | 3 |
| TDD configuration |  | 1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | N/A | SR.3.1 TDD | N/A |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | N/A | CR.3.1 TDD | N/A |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | N/A | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | 1 | OP.1 | OP.1 | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS | dB | 1 | 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 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | N/A | TRS.2.1 TDD | N/A |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A | DLBWP.0.1 ULBWP.0.1 | N/A |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | N/A | DLBWP.1.1 | N/A |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | N/A | ULBWP.1.1 | N/A |
| PRS configuration |  | 1 | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 FR2 |
| PRS Resource slot offset | slot | 1 | 0 | 4 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A | POS-SRS.3 | N/A |
| Note 2 | dBm/SCS | 1 | -89 | | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | | -98 | |
| PRS | dB | 1 | -2.41 | -12.12 | -2.41 | -12.12 |
| PRS | dB | 1 | -2 | -10 | -2 | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -91 | -99 | -91 | -99 |
| Io | dBm/190.08 MHz | 1 | -54.62 | -54.62 | -54.62 | -54.62 |
| Propagation Condition |  | 1 | AWGN | | AWGN | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 6: As observed with 0 dBi gain antenna at the centre of the quiet zone.  NOTE 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  NOTE 8: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured.  NOTE 9: 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.17.7.6.2.3 Test requirements

The UE Rx-Tx time difference measurement fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1A.18.2.3 and 10.1A.18.2.4 for both Cell 1 and Cell 2.

## **--- End of Change # 52 ---**

## **--- start of Change # 53 ---**

#### A.17.7.7.1 PRS-RSRP measurement accuracy without FH in RRC\_CONNECTED state in FR2

##### A.17.7.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement without FH by a RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1A.17.2.1 and 10.1A.17.2.2.

##### A.17.7.7.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.7.7.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.17.7.7.1.2-2 and A.17.7.7.1.2-3. 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.17.7.7.1.2-1: PRS-RSRP supported test configurations

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

Table A.17.7.7.1.2-2: PRS-RSRP 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 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.1 | OP.1 | OP.1 | OP.1 |
| 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 |
| Expected RSTD | μs | 3 | | | |
| Expected RSTD uncertainty | μs | 5 | | | |
| PRS configuration |  | PRS.1.3 FR2 | PRS.1.3 FR2 | PRS.1.5 FR2 | PRS.1.5 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 |  |  |  |  |  |
| EPRE ratio of PRS to SSS | dB | 0 | 0 | 0 | 0 |
| Propagation conditions |  | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 | 1x2 |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | | |

Table A.17.7.7.1.2-3: PRS-RSRP 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 5 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote3 | -98 | | -98 | |
| Note1 | dBm/SCSNote3 | -89 | | -89 | |
| PRS | dB | -2 | -10 | -2 | 10 |
| PRPNote2 | dBm/SCS | -91 | -99 | -91 | -99 |
| PRS | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| IoNote2 | dBm/95.04 MHz Note3 | -57.63 | | -57.63 | |
| NOTE 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 2: PRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4.  NOTE 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | |

##### A.17.7.7.1.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1 if the reported PRS-RSRP is in the range shown in table A.17.7.7.1.3-1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.2.

Table A.17.7.7.1.3-1: PRS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| NOTE 1: PRS\_RPn 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 RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, 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 # 53 ---**

## **--- start of Change # 54 ---**

#### A.17.7.7.2 PRS-RSRP measurement accuracy with FH in RRC\_CONNECTED state in FR2

##### A.17.7.7.2.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement with FH by a RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1A.17.2.1 and 10.1A.17.2.2.

##### A.17.7.7.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.7.7.2.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.17.7.7.2.2-2 and A.17.7.7.2.2-3. 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. PRS RX hopping is present in *NR-DL-AoD-RequestLocationInformation*.

Table A.17.7.7.2.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

Table A.17.7.7.2.2-2: PRS-RSRP 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 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.1 | OP.1 | OP.1 | OP.1 |
| 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 |
| Expected RSTD | μs | 3 | | | |
| Expected RSTD uncertainty | μs | 5 | | | |
| PRS configuration |  | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 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 |  |  |  |  |  |
| EPRE ratio of PRS to SSS | dB | 0 | 0 | 0 | 0 |
| Propagation conditions |  | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 | 1x2 |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | | | |

Table A.17.7.7.2.2-3: PRS-RSRP 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 5 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote3 | -98 | | -98 | |
| Note1 | dBm/SCSNote3 | -89 | | -89 | |
| PRS | dB | -2 | -10 | -2 | 10 |
| PRPNote2 | dBm/SCS | -91 | -99 | -91 | -99 |
| PRS | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| IoNote2 | dBm/95.04 MHz Note3 | -57.63 | | -57.63 | |
| NOTE 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 2: PRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4.  NOTE 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | |

##### A.17.7.7.2.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1 if the reported PRS-RSRP is in the range shown in table A.17.7.7.2.3-1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.2.

Table A.17.7.7.2.3-1: PRS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| NOTE 1: PRS\_RPn 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 RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, 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 # 54 ---**

## **--- Start of Change # 55 ---**

A.17.7.8.1 PRS-RSRPP measurement accuracy without FH in RRC\_CONNECTED state in FR2

##### A.17.7.8.1.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRPP measurement without FH by a RedCap UE in RRC\_CONNECTED is within the specified limits. This test will verify the requirements in clauses 10.1A.19.2.

##### A.17.7.8.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.7.8.1.2-1. 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.17.7.8.1.2-1: PRS-RSRPP supported test configurations

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

Table A.17.7.8.1.2-2: 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 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.1 RedCap FR2 | SSB.1 RedCap FR2 | SSB.1 RedCap FR2 | SSB.1 RedCap FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PRS configuration |  | PRS.1.5 FR2 | PRS.1.5 FR2 | PRS.1.5 FR2 | PRS.1.5 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.17.7.8.1.2-3: 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 5 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote3 | -98 | | Same as Test 1 | |
| Note1 | dBm/SCSNote3 | -89 | | Same as Test 1 | |
|  | dB | -2 | -10 | -2 | -10 |
| Es | dBm/SCSNote3 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -91 | -99 | -91 | -99 |
| BB Note4 | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| IoNote2 | dBm/190.08 MHz Note3 | -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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | |

##### A.17.7.8.1.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.19.2 if the reported PRS-RSRPP is in the range shown in table A.17.7.8.1.2-1.

Table A.17.7.8.1.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| NOTE 1: PRS\_RPn 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 RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, 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 # 55 ---**

## **--- Start of Change # 56 ---**

#### A.17.7.8.2 SA: PRS-RSRPP measurement accuracy TC with Rx FH in RRC\_CONNECTED state in FR2

##### A.17.7.8.2.1 Test purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRPP measurement with FH by a RedCap UE in RRC\_CONNECTED is within the specified limits. This test will verify the requirements in clauses 10.1A.19.2.

##### A.17.7.8.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.7.8.2.2-1. 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.17.7.8.2.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

Table A.17.7.8.2.2-2: PRS-RSRPP general test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
|  |  |
| Cell ID |  | 489 | 0 |
| SSB ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | |
| 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.1 RedCap FR2 | SSB.1 RedCap FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 |
| PRS configuration |  | PRS.1.6 FR2 | PRS.1.6 FR2 |
| 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 defined in 38.101-4 Annex B.2.4,  *a* = 1, µs and Hz | |
| Antenna configuration |  | 1x2 | 1x2 |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured. | | | |

Table A.17.7.8.2.2-3: PRS-RSRPP OTA related test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 | |
|  |  |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | |
| Assumption for UE beamsNote 5 |  | Rough | | |
| Note1 | dBm/15kHzNote3 | -98 | | |
| Note1 | dBm/SCSNote3 | -89 | | |
|  | dB | -2 | | -10 |
| Es | dBm/SCSNote3 | - | | - |
| PRS\_RPNote2 | dBm/SCS | -91 | | -99 |
| BB Note4 | dB | -2.41 | | -12.12 |
| IoNote2 | dBm/190.08 MHz Note3 | -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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | |

##### A.17.7.8.2.3 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.17.7.8.2.3-1.

Table A.17.7.8.2.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| NOTE 1: PRS\_RPn 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 RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, 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 # 56 ---**

## **--- Start of Change # 57 ---**

#### A.17.8.1.1 NR RSTD measurement reporting delay test case for RedCap UE without FH in FR2 SA in RRC\_INACTIVE state

##### A.17.8.1.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC INACTIVE state meets the requirements specified in Clause 5.6A.4.5 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.17.8.1.1.1-1.

Table A.17.8.1.1.1-1: Supported test configurations for NR RSTD

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

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

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2 and Cell3. During T2 UE shall be in RRC\_INACTIVE state and all cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the RedCap UE during T1. The measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The last TTI containing the two messages shall be provided to the RedCap UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the first DRX cycle containing a DL PRS resource(s).

The UE is configured with DRX cycle of 0.64 s.

The general test parameters are listed in Table A.17.8.1.1.1-2, and cell specific test parameters are listed in Table A.17.8.1.1.1-3 and Table A.17.8.1.1.1-4.

Table A.17.8.1.1.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| BWchannel | | MHz | 100: NRB,c = 66 |  |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.5. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | | s | 0.64 |  |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 4 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.17.8.1.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.5 FDD | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -57 | -57 | -57 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.17.8.1.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|  | |  | T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.44 | -11.67 | -11.67 |
| Io | Config 1 | dBm/  95.04MHz | -58.49 | -58.49 | -58.49 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cells (all, except Cell 3 in T2) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  NOTE 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

##### A.17.8.1.1.2 Test Requirements

The RSTD measurement time without FH for RedCap fulfils the requirements specified in Clause 5.6A.4.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 5.6A.4.5 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 each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

## **--- End of Change # 57 ---**

## **--- Start of Change # 58 ---**

#### A.17.8.1.2 NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA in RRC\_INACTIVE state

##### A.17.8.1.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 5.6A.4.6 in FR2 in standalone scenario when PRS frequency hopping is configured.

The supported test configurations are specified in Table A.17.8.1.2.1-1.

Table A.17.8.1.2.1-1: Supported test configurations for NR RSTD

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

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

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2 and Cell3. During T2 UE shall be in RRC\_INACTIVE state and all cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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

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

The test requirements apply when *frequencyHopping* is configured to UE.

The beginning of the time interval T2 shall be aligned with the first DRX cycle containing a DL PRS resource(s).

The UE is configured with DRX cycle of 0.64 s.

The general test parameters are listed in Table A.17.8.1.2.1-2, and cell specific test parameters are listed in Table A.17.8.1.2.1-3 and Table A.17.8.1.2.1-4.

Table A.17.8.1.2.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| BWchannel | | MHz | 100: NRB,c = 66 |  |
| SSB configuration | Config 1 |  | SSB.1 RedCap FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 RedCap |  |
| PDSCH RMC configuration | Config 1 |  | SR.3.2 TDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD |  |
| Dedicated CORESET RMC configuration | Config 1 |  | CCR.3.1 TDD |  |
| PRS Configuration | Config 1 |  | PRS.1.6 FR2 | PRS configured with frequency hopping as specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | | s | 0.64 |  |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 16 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.17.8.1.2.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

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

Table A.17.8.1.2.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|  | |  | T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.44 | -11.67 | -11.67 |
| Io | Config 1 | dBm/  9.36MHz | -59.65 | -59.92 | -59.92 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  NOTE 2: 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 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

##### A.17.8.1.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 5.6A.4.6.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 5.6A.4.6 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

## **--- End of Change # 58 ---**

## **--- Start of Change # 59 ---**

#### A.17.8.2.2 UE Rx-Tx time difference measurement with Rx FH for single positioning frequency layer in FR2 SA in RRC\_INACTIVE state

##### A.17.8.2.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement with Rx FH meets the requirements specified in clause 5.6A.6.6 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are listed in Table A.17.8.2.2.1-1.

Table A.17.8.2.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

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

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2.

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the RedCap UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In the next DL slot after slot #n, RedCap UE is released into RRC\_INACTIVE state.

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The UE is configured to transmit positioning SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.17.8.2.2.1-2 and Table A.17.8.2.2.1-3, respectively.

Table A.17.8.2.2.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1 | Cell 1 | Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| Neighbour cell |  | 1 | Cell 2 | Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34]. |
| RF Channel Number |  | 1 | 1 | For both Cell 1 and Cell 2 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 |  |
| SSB configuration |  | 1 | SSB.3 FR2 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| CP length |  | 1 | Normal |  |
| DRX |  | 1 | 1.28s |  |
| Time offset between serving and neighbour cells | μs | 1 | 3 | Synchronous cells |
| PRS RX hopping request |  | 1 | requested |  |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 10 |  |

Table A.17.8.2.2.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 |  | 1 | Rough | | Rough | |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| EPRE ratio of PSS to SSS | dB | 1 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| EPRE ratio of PRS to SSS |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Initial BWP configuration |  | 1 | DLBWP.0.1  ULBWP.0.1 | | N/A | |
| PRS configuration |  | 1 | PRS.1.6 FR2 | | PRS.1.6 FR2 | |
| PRS muting info |  | 1 | ‘10’ | | ‘01’ | |
| SRS configuration |  | 1 | POS-SRS.3 | | N/A | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| PRS | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
| PRS | dB | 1 | -Infinity | -2 | -Infinity | -10 |
| PRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -91 | -Infinity | -99 |
| Io | dBm/190.08 MHz | 1 | N/A | -54.62 | N/A | -54.62 |
| Propagation Condition |  | 1 | AWGN | | | |
| NOTE 1: 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: PRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  NOTE 6: As observed with 0 dBi gain antenna at the centre of the quiet zone.  NOTE 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  NOTE 8: Calculation of Es/Iot includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.17.8.2.2.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 5.6A.6.6.

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

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

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1A.18.3.

## **--- End of Change # 59 ---**

## **--- Start of Change # 60 ---**

#### A.17.8.3.1 PRS-RSRP reporting delay test case for single positioning frequency layer in RRC\_INACTIVE

##### A.17.8.3.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements specified in Clause 9.9A.3.5 for single positioning frequency layer under AWGN propagation conditions in RRC\_INACTIVE. Supported test configurations are shown in table A.17.8.3.1.1-1.

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.

During T1 UE is in RRC\_CONNECTED, 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 measurement reporting delay test in this clause is valid in the cases where the RedCap UE is either not configured by the LMF to perform PRS-RSRP measurement with RX FH via *NR-DL-AoD-RequestLocationInformation* or the UE is configured by the LMF to perform PRS-RSRP measurement with RX FH and reports the PRS-RSRP measurement based on the single hop in *NR-DL-AoD-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12]. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the 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.17.8.3.1.1-2, and table A.17.8.3.1.1-3.

Table A.17.8.3.1.1-1: supported test configurations for PRS RSRP measurement for FR2

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

Table A.17.8.3.1.1-2: General test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (PCell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| CP length |  | Config 1 | Normal |  |
| DRX |  | Config 1 | 0.64 s |  |
| Time offset between serving and neighbour cells |  | Config 1 | 3 μs | Synchronous cells. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 41 |  |

Table A.17.8.3.1.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  | |  | T1 | | T2 | T1 | T2 | |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | | Rough | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| Duplex mode | |  | Config 1 | TDD | | | TDD | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | | N/A | | |
| 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 | | | - | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | | 120 | | |
| PRS configuration | |  | Config 1 | PRS.1.5 FR2 | | | PRS.1.5 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 | -91 | | -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/95.04 MHz Note5 | Config 1 | -57.89 | -57.63 | | -57.89 | | -57.63 |
| Propagation Condition | |  | Config 1 | AWGN | | | | | |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: SS-RSRP/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 6: As observed with 0 dBi gain antenna at the centre of the quiet zone.  NOTE 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | | | | | |

##### A.17.8.3.1.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9A.3.5. The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9A.3.5 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 RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1A.17, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

## **--- End of Change # 60 ---**

## **--- Start of Change # 61 ---**

A.17.8.3.2 PRS-RSRP measurement delay with FH in RRC\_INACTIVE state in FR2

A.17.8.3.2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement with FH by a RedCap UE meets requirements specified in Clause 5.6A.5.5 for single positioning frequency layer under AWGN propagation conditions in RRC\_INACTIVE. Supported test configurations are shown in table A.17.8.3.2.1-1.

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 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.

During T1 UE is in RRC\_CONNECTED, the *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the 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.7.8.1.2.1.1-2, and table A.17.8.3.2.1-3.

**Table A.17.8.3.2.1-1: supported test configurations for PRS RSRP measurement for FR2-FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

**Table A.17.8.3.2.1-2: General test parameters for PRS RSRP measurement reporting delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| NR RF Channel Number |  | Config 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | Config 1 | NR cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| SMTC parameters |  | Config 1 | SMTC.1 | As specified in clause A.3.11 |
| SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| CP length |  | Config 1 | Normal |  |
| DRX |  | Config 1 | 0.64 s |  |
| Time offset between serving and neighbour cells |  | Config 1 | 3 μs | Synchronous cells. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| PRS RX hopping request |  | Config 1 | Present |  |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 41 |  |

**Table A.17.8.3.2.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | | |
|  | |  | **T1** | **T2** | | **T1** | **T2** | |
| AoA setup | |  | Config 1 | Setup 1 as specified in clause A.3.15 | | | | | |
| Beam AssumptionNote 7 | |  | Config 1 | Rough | | | Rough | | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| Duplex mode | |  | Config 1 | TDD | | | TDD | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | | N/A | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | | 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 | | | - | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | | 120 | | |
| PRS configuration | |  | Config 1 | PRS.1.6 FR2 | | | PRS.1.6 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 | -91 | -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/95.04 MHz Note5 | Config 1 | -60.01 | | -57.63 | -60.01 | | -57.63 |
| Propagation Condition | |  | Config 1 | AWGN | | | | | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: 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.17.8.3.2.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 5.6A.5.5. The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 5.6A.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 RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1A.17.3, i.e., between PRS RSRP\_0 and PRS RSRP\_126.

## **--- End of Change # 61 ---**

## **--- Start of Change # 62 ---**

A.17.8.4.1 PRS-RSRPP measurement delay without FH in RRC\_INACTIVE state in FR2

A.17.8.4.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRPP measurement without FH by a RedCap UE meets requirements specified in Clause 5.6A.7.5 for single positioning frequency layer under a 2-tap channel propagation conditions in standalone scenario. Supported test configurations are shown in table A.17.8.4.1.1-1.

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.17.8.4.1.1-2, and table A.17.8.4.1.1-3.

**Table A.17.8.4.1 .1-1: supported test configurations for PRS RSRPP measurement for FR2**

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

**Table A.17.8.4.1 .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 |
| CP length |  | Config 1 | Normal |  |
| DRX | s | Config 1 | 0.64 | ON |
| Time offset between serving and neighbour cells | μs | Config 1 | 3 | Synchronous cells. |
| Expected RSTD | μs | Config 1 | 3 |  |
| Expected RSTD uncertainty | μs | Config 1 | 5 |  |
| PRS RX hopping request |  | Config 1 | NOT present |  |
| T1 | S | Config 1 | 5 |  |
| T2 | S | Config 1 | 7 |  |

**Table A.17.8.4.1 .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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
| 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.1.3 FR2 | | PRS.1.3 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 | -2.12 | -Infinity | -12.12 |
| PRS | | dB | Config 1 | -Infinity | -2 | -Infinity | -10 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -60.01 | -57.63 | -60.01 | -57.63 |
| 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 active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: 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.17.8.4.1 .2 Test Requirements

The PRS RSRPP measurement time fulfils the requirements specified in Clause 5.6A.7.5. 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 5.6A.7.5 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 10.1A.19.3, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

## **--- End of Change # 62 ---**

## **--- Start of Change # 63 ---**

#### A.17.8.4.2 PRS-RSRPP measurement with Rx FH reporting delay test case for single positioning frequency layer in FR2 SA in RRC\_INACTIVE state

##### A.17.8.4.2.1 Test Purpose and Environment

The purpose of the test is to verify that the PRS-RSRPP measurement requirements with Rx FH in RRC\_INACTIVE state meets the delay requirements specified in Clause 5.6A.7.6 in an environment with two-tap channel propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.17.8.4.2.1-1.

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 FR2. 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. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The test requirements apply when *frequencyHopping* is configured to UE.

The beginning of the time interval T2 shall be aligned with the first DRX cycle containing a DL PRS resource occasion occuring 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.17.8.4.2.1-2, and table A.17.8.4.2.1-3.

**Table A.17.8.4.2.1-1: supported test configurations for PRS-RSRPP measurement for FR2**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

**Table A.17.8.4.2.1-2: 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 | 1.28 |  |
| Time offset between serving and neighbour cells | μs | Config 1 | 3 | Synchronous cells. |
| PRS RX hopping request |  | 1 | requested |  |
| 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.17.8.4.2.1-3: 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1  RedCap | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1  RedCap | | 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.1.6 FR2 | | PRS.1.6 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.17.8.4.2.2 Test Requirements

The PRS-RSRPP measurement time fulfils the requirements specified in Clause 5.6A.7.6. 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 5.6A.7.6 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 10.1A.19.3, i.e., between PRS RSRPP\_0 and PRS RSRPP\_126.

## **--- End of Change # 63 ---**

## **--- Start of Change # 64 ---**

#### A.17.9.1.1 RSTD measurement accuracy test case for RedCap UE without FH in FR2 in RRC\_INACTIVE state

##### A.17.9.1.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC\_INACTIVE state meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.17.9.1.1.1-1.

Table A.17.9.1.1.1-1: Supported test configurations

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

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 FR2. The UE is configured with DRX cycle of 0.64 s. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the RedCap UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 5.6A.4.5.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The accuracy test parameters and OTA related test parameters are as given in Table A.17.9.1.1.1-2 and Table A.17.9.1.1.1-3, respectively.

Table A.17.9.1.1.1-2: RSTD accuracy test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| PRS ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - |
| 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 |
| PRS configuration |  | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS Resource slot offset | slot | 0 | 4 |
| Expected RSTD | μs | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation conditions |  | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

Table A.17.9.1.1.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 5 |  | Rough | |
| Note1 | dBm/SCSNote3 | -89 | |
| PRS | dB | -5.7 | -11.9 |
| PRS-RSRPNote2 | dBm/SCS | -94.7 | -100.9 |
| PRS BB Note4 | dB | -6 | -13 |
| IoNote2 | dBm/95.04 MHz Note3 | -58.76 | -58.76 |
| 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: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | |

##### A.17.9.1.1.2 Test Requirements

The RSTD measurement accuracy shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 64 ---**

## **--- Start of Change # 65 ---**

#### A.17.9.1.2 RSTD measurement accuracy test case for RedCap UE with FH in FR2 in RRC\_INACTIVE state

##### A.17.9.1.2.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement in RRC\_INACTIVE state meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.17.9.1.2.1-1. The test parameters are as given in Table A.17.9.1.2.1-2, Table A.17.9.1.2.1-3 and Table A.17.9.1.2.1-4.

**Table A.17.9.1.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

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 FR2. The UE is configured with DRX cycle of 0.64s. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* as specified in TS 37.355 [34, clause 6.5.12]. The frequency hopping configurations are specified in clause A.3.31.

**Table A.17.9.1.2.1-2: RSTD accuracy test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
|  |  | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| PRS ARFCN |  | freq1 | | freq1 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - | ULBWP.1.1 | - |
| 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 |
| PRS configuration |  | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 FR2 |
| PRS Resource slot offset | slot | 0 | 4 | 0 | 4 |
| Expected RSTD | μs | N/A | 3 | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| 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 |  | AWGN | AWGN | AWGN | AWGN |
| 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. | | | | | |

**Table A.17.9.1.2.1-3: RSTD accuracy 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 5 |  | Rough | | Rough | |
| Note1 | dBm/SCSNote3 | -89 | | -89 | |
|  | dB | -5.7 | -11.9 | -5.7 | -11.9 |
| PRS-RSRPNote2 | dBm/SCS | -94.7 | -100.9 | -94.7 | -100.9 |
| BB Note4 | dB | -6 | -13 | -6 | -13 |
| IoNote2 | dBm/190.08 MHz Note3 | -55.75 | -55.75 | -55.75 | -55.75 |
| NOTE 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 2: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | |

##### A.17.9.1.2.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 65 ---**

## **--- Start of Change # 66 ---**

#### A.17.9.2.2 SA: UE Rx-Tx time difference measurement accuracy TC with Rx FH in RRC\_INACTIVE state in FR2

##### A.17.9.2.2.1 Test purpose and Environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement requirements with FH by RedCap UE in RRC\_INACTIVE state is within the specified limits. This test will verify the requirements in clause 10.1A.18.2.3 and 10.1A.18.2.4. The test is conducted in AWGN propagation condition in FR2 in standalone scenario.

The supported test configuration is listed in Table A.17.9.2.2.1-1.

Table A.17.9.2.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

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

The *NR-Multi-RTT-ProvideAssistanceData* and *nr-Multi-RTT-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test. The test requirements apply when *frequencyHopping* is configured to UE.

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

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

##### A.17.9.2.2.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.17.9.2.2.2-1.

Table A.17.9.2.2.2-1: UE Rx-Tx time difference measurement accuracy test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Test 1 | | Test 2 | |
|  | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| AoA setup |  | 1 | Setup 1 as specified in clause A.3.15 | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 |  | 1 | Rough | Rough | Rough | Rough |
| DRX | s | 1 | 0.64 | | 0.64 | |
| Time offset with Cell 1 | μs | 1 | N/A | 3 | N/A | 3 |
| TDD configuration |  | 1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | N/A | SR.3.1 TDD | N/A |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | N/A | CR.3.1 TDD | N/A |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | N/A | CCR.3.1 TDD | N/A |
| OCNG Patterns |  | 1 | OP.1 | OP.1 | OP.1 | OP.1 |
| Initial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | N/A | DLBWP.0.1 ULBWP.0.1 | N/A |
| PRS configuration |  | 1 | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 FR2 |
| PRS Resource slot offset | slot | 1 | 0 | 4 | 0 | 4 |
| SRS configuration |  | 1 | POS-SRS.3 | N/A | POS-SRS.3 | N/A |
| Note 2 | dBm/SCS | 1 | -89 | | -89 | |
| Note 2 | dBm/15 kHz | 1 | -98 | | -98 | |
| PRS | dB | 1 | -2.41 | -12.12 | -2.41 | -12.12 |
| PRS | dB | 1 | -2 | -10 | -2 | -10 |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -91 | -99 | -91 | -99 |
| Io | dBm/190.08 MHz | 1 | -54.62 | -54.62 | -54.62 | -54.62 |
| Propagation Condition |  | 1 | AWGN | | AWGN | |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  NOTE 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 6: As observed with 0 dBi gain antenna at the centre of the quiet zone.  NOTE 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  NOTE 8: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.17.9.2.2.3 Test requirements

The UE Rx-Tx time difference measurement time fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1A.18.2.3 and 10.1A.18.2.4 for both Cell 1 and Cell 2.

## **--- End of Change # 66 ---**

## **--- Start of Change # 67 ---**

A.17.9.3.1 PRS-RSRP measurement accuracy without FH in RRC\_INACTIVE state in FR2

A.17.9.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement without FH by a RedCap UE in RRC\_INACTIVE is within the specified limits. This test will verify the requirements in clauses 10.1A.17.2.1 for absolute accuracy and 10.1A.17.2.2 for relative accuracy.

A.17.9.3.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.9.3.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.17.9.3.1.2-2 and A.17.9.3.1.2-3. In all test cases, Cell 1 is the PCell.

**Table A.17.9.3.1.2-1: PRS-RSRP supported test configurations**

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

**Table A.17.9.3.1.2-2: PRS-RSRP 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| DRX cycle configuration |  | 1.28s | - | 1.28s | - |
| 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.1.5 FR2 | PRS.1.5 FR2 | PRS.1.5 FR2 | PRS.1.5 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 |  | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 | 1x2 |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. | | | | | |

**Table A.17.9.3.1.2-3: PRS-RSRP 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 5 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote3 | -98 | | Same as Test 1 | |
| Note1 | dBm/SCSNote3 | -89 | | Same as Test 1 | |
|  | dB | -2 | -10 | -2 | -10 |
| Es | dBm/SCSNote3 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -91 | -99 | -91 | -99 |
| BB Note4 | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| IoNote2 | dBm/95.04 MHz Note3 | -57.63 | | -57.63 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | |

A.17.9.3.1.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1 if the reported PRS-RSRP is in the range shown in table A.17.9.3.1.3-1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.2.

**Table A.17.9.3.1.3-1: PRS-RSRP absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| NOTE 1: PRS\_RPn 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 RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, 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 # 67 ---**

## **--- Start of Change # 68 ---**

#### A.17.9.3.2 PRS-RSRP measurement accuracy with FH in RRC\_INACTIVE state in FR2

##### A.17.9.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the accuracy of PRS-RSRP measurement with FH by a RedCap UE in RRC\_INACTIVE is within the specified limits. This test will verify the requirements in clauses 10.1A.17.2.1 for absolute accuracy and 10.1A.17.2.2 for relative accuracy.

##### A.17.9.3.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.9.3.2.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.17.9.3.2.2-2 and A.17.9.3.2.2-3. In all test cases, Cell 1 is the PCell. PRS RX hopping is present in *NR-DL-AoD-RequestLocationInformation*.

Table A.17.9.3.2.2-1: PRS-RSRP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

Table A.17.9.3.2.2-2: PRS-RSRP 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| DRX cycle configuration |  | 1.28s | - | 1.28s | - |
| 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.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 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 |  | AWGN | AWGN | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 | 1x2 |
| NOTE 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. | | | | | |

Table A.17.9.3.2.2-3: PRS-RSRP 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 5 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote3 | -98 | | Same as Test 1 | |
| Note1 | dBm/SCSNote3 | -89 | | Same as Test 1 | |
|  | dB | -2 | -10 | -2 | -10 |
| Es | dBm/SCSNote3 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -91 | -99 | -91 | -99 |
| BB Note4 | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| IoNote2 | dBm/95.04 MHz Note3 | -57.63 | | -57.63 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | |

##### A.17.9.3.2.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1 if the reported PRS-RSRP is in the range shown in table A.17.9.3.2.3-1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.1.

Table A.17.9.3.2.3-1: PRS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| NOTE 1: PRS\_RPn 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 RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, 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 # 68 ---**

## **--- Start of Change # 69 ---**

#### A.17.9.4.1 SA: PRS-RSRPP measurement accuracy TC with Rx FH in RRC\_INACTIVE state in FR2

##### A.17.9.4.1.1 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 10.1A.19.2.

##### A.17.9.4.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.9.4.1.2-1. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.17.9.4.1.2-2 and TRS configuration for Cell 1 is defined in Table A.17.9.4.1.2-2.

Table A.17.9.4.1.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

Table A.17.9.4.1.2-2: 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 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.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 FR2 | PRS.1.6 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). | | | | | |

TableA.17.9.4.1.2-3: 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 5 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote3 | -98 | | Same as Test 1 | |
| Note1 | dBm/SCSNote3 | -89 | | Same as Test 1 | |
|  | dB | -2 | -10 | -2 | -10 |
| Es | dBm/SCSNote3 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -91 | -99 | -91 | -99 |
| BB Note4 | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| IoNote2 | dBm/190.08 MHz Note3 | -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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | |

##### A.17.9.4.1.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.19.2. if the reported PRS-RSRPP is in the range shown in table A.17.9.4.1.3-1.

Table A.17.9.4.1.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| NOTE 1: PRS\_RPn 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 RSRP absolute accuracy requirement from Table [10.1.24.Z.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 # 69 ---**

## **--- Start of Change # 70 ---**

#### A.17.9.4.2 SA: PRS-RSRPP measurement accuracy TC with Rx FH in RRC\_INACTIVE state in FR2

##### A.17.9.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRPP measurement accuracy in RRC\_INACTIVE state with FH by a RedCap UE is within the specified limits. This test will verify the requirements in clauses 10.1A.19.2.

##### A.17.9.4.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.9.4.2.2-1. 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.17.9.4.2.2-1.

Table A.17.9.4.2.2-1: PRS-RSRPP supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, UE bandwidth 100 MHz, Cell bandwidth 400 MHz, TDD duplex mode |

Table A.17.9.4.2.2-2: PRS-RSRPP general test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
|  |  |
| Cell ID |  | 489 | 0 |
| SSB ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | |
| 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 RedCap FR2 | SSB.3 RedCap FR2 |
| SMTC configuration |  | SMTC.1 | SMTC.1 |
| Time offset with Cell 1 | μs | - | 3 |
| PRS configuration |  | PRS.1.6 FR2 | PRS.1.6 FR2 |
| 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 TS 38.101-4 Annex B.2.4 (a = 1, τd=0.45 µs and fD=5 Hz). | | | |

Table A.17.9.4.2.2-3: PRS-RSRPP OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
|  |  |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 5 |  | Rough | |
| Note1 | dBm/15kHzNote3 | -98 | |
| Note1 | dBm/SCSNote3 | -89 | |
|  | dB | -2 | -10 |
| Es | dBm/SCSNote3 | - | - |
| PRS\_RPNote2 | dBm/SCS | -91 | -99 |
| BB Note4 | dB | -2.41 | -12.12 |
| IoNote2 | dBm/190.08 MHz Note3 | -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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | |

##### A.17.9.4.2.3 Test Requirements

In each test, the absolute PRS-RSRPP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.19.2, if the reported PRS-RSRPP is in the range shown in table A.17.9.4.2.3-1.

Table A.17.9.4.2.3-1: PRS-RSRPP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRPP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| NOTE 1: PRS\_RPn 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, 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 # 70 ---**

## **--- Start of Change # 71 ---**

#### A.17.10.1.1 NR RSTD measurement reporting delay test case for RedCap UE without FH in FR2 SA in RRC\_IDLE state without eDRX

##### A.17.10.1.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC IDLE state and without eDRX meets the requirements specified in Clause 4.6.2.5 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.17.10.1.1.1-1.

Table A.17.10.1.1.1-1: Supported test configurations for NR RSTD

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

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

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall be in RRC\_CONNECTED state and shall not have any timing information of Cell 2 and Cell3. During T2 UE shall be in RRC\_IDLE state and all cells transmit PRS resources within initial DL BWP of the UE and with the same numerology as the initial DL BWP.

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

The *NR-DL-TDOA-ProvideAssistanceData* and *nr-DL-TDOA-RequestLocationInformation* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the RedCap UE during T1. The measurement reporting delay test in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The last TTI containing the two messages shall be provided to the RedCap UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the first DRX cycle containing a DL PRS resource(s).

The UE is configured with DRX cycle of 0.64 s.

The general test parameters are listed in Table A.17.10.1.1.1-2, and cell specific test parameters are listed in Table A.17.10.1.1.1-3 and Table A.17.10.1.1.1-4.

Table A.17.10.1.1.1-2: General test parameters for RSTD measurement reporting delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Reference cell | |  | Cell 1 | Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case. |
| Neighbor cells | |  | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at the first and second places in the neighbour cell list in the DL-TDOA assistance data. |
| BWchannel | | MHz | 100: NRB,c = 66 |  |
| SSB configuration | Config 1 |  | SSB.2 FR2 |  |
| SMTC configuration | Config 1 |  | SMTC.1 |  |
| PDSCH RMC configuration | Config 1 |  | SR.1.1 FDD |  |
| RMSI CORESET RMC configuration | Config 1 |  | CR.3.1 TDD | As specified in clause A.3.1.2.1 |
| Dedicated CORESET RMC configuration | Config 1 |  | CR.1.1 FDD |  |
| PRS Configuration | Config 1 |  | PRS.1.5. FR2 | As specified in clause A.3. 31 |
| Physical cell ID PCI | |  | (PCI of Cell 1 – PCI of Cell 2)mod6=0  and  (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | |  | Normal |  |
| DRX | | s | 0.64 |  |
| Radio frame receive time offset between the cells at the UE antenna connector | | μs | Cell 2 to Cell 1: 0  Cell 3 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Expected RSTD | | μs | Cell 2: 3  Cell 3: 3  Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | | μs | 5 | The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index |
| Number of cells provided in DL-TDOA assistance data | |  | 4 | Including the reference cell |
| PRS muting info | |  | Cell 1: ‘10’  Cell 2: ‘01’  Cell 3: ‘10’ | Correponds to prs-MutingInfo defined in TS 37.355 [24] |
| PRS resource RE offset | |  | Cell 1: 0  Cell 2: 0  Cell 3: 1 | Cell 1 and Cell 3 are configured with different resource offsets |
| T1 | | s | 3 | The length of the time interval from the beginning of each test |
| T2 | | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Beam assumption | |  | Rough | Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

Table A.17.10.1.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
| NR RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.5 FDD | N/A | N/A |
| Note 3 | Config 1 | dBm/SCS | -89 | | |
| PRS | | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | Config 1 | dBm/  95.04MHz | -57 | -57 | -57 |
| SSB RP Note4 | Config 1 | dBm/SCS | -89 | -Infinity | -Infinity |
|  |  | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. | | | | | |

Table A.17.10.1.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|  | |  | T2 | T2 | T2 |
| RF Channel Number | |  | 1 | 1 | 1 |
| Positiong frequency layer | |  | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | |  | OP.1 | OP.1 | OP.1 |
| PRACH configuration | |  | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 | FR2 PRACH configuration 1 |
| Note 3 | Config 1 | dBm/SCS | -89 | -89 | -89 |
| PRS | Config 1 | dB | -5.44 | -11.67 | -11.67 |
| Io | Config 1 | dBm/  95.04MHz | -58.49 | -58.49 | -58.49 |
| PRS | | dB | -6 | -13 | -13 |
| Propagation Condition | |  | AWGN | | |
| NOTE 1: OCNG shall be used such that active cells (all, except Cell 3 in T2) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the slots with transmitted PRS.  NOTE 2: The resources for uplink transmission are assigned after the end of time period T2 to UEs that do not support SDT for measurement reporting.  NOTE 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled. | | | | | |

##### A.17.10.1.1.2 Test Requirements

The RSTD measurement time without FH for RedCap fulfils the requirements specified in Clause 4.6.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 4.6.2.5 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 each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1A.16.3, i.e., between RSTD\_0000000 and RSTD\_1970049.

## **--- End of Change # 71 ---**

## **--- Start of Change # 72 ---**

#### A.17.11.1.1 RSTD measurement accuracy test case for RedCap UE without FH in FR2 in RRC\_IDLE state without eDRX

##### A.17.11.1.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement for RedCap UE without FH in RRC\_IDLE state and without eDRX meets the accuracy requirements specified in clause 10.1A.16.2 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.17.11.1.1.1-1.

Table A.17.11.1.1.1-1: Supported test configurations

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

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 FR2. The UE is configured with DRX cycle of 0.64 s. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the RedCap UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 4.6.2.5.

The RSTD measurement accuracy in this clause is valid for the cases where the RedCap UE is either not configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* or the RedCap UE is configured by the LMF to perform RSTD measurement with RX FH via *NR-DL-TDOA-RequestLocationInformation* but reports the RSTD measurement based on the single hop in *NR-DL-TDOA-SignalMeasurementInformation* as specified in TS 37.355 [34, clause 6.5.12].

The accuracy test parameters and OTA related test parameters are as given in Table A.17.11.1.1.1-2 and Table A.17.11.1.1.1-3, respectively.

Table A.17.11.1.1.1-2: RSTD accuracy test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| PRS ARFCN |  | freq1 | |
| Duplex mode |  | TDD | |
| TDD configuration |  | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | - |
| 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 |
| PRS configuration |  | PRS.1.1 FR2 | PRS.1.1 FR2 |
| PRS Resource slot offset | slot | 0 | 4 |
| Expected RSTD | μs | N/A | 3 |
| Expected RSTD uncertainty | μs | N/A | 5 |
| Time offset with Cell 1 | μs | - | 3 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS |  |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS |  |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation conditions |  | AWGN | AWGN |
| Antenna configuration |  | 1x2 | 1x2 |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

Table A.17.11.1.1.1-3: RSTD accuracy OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 5 |  | Rough | |
| Note1 | dBm/SCSNote3 | -89 | |
| PRS | dB | -5.7 | -11.9 |
| PRS-RSRPNote2 | dBm/SCS | -94.7 | -100.9 |
| PRS BB Note4 | dB | -6 | -13 |
| IoNote2 | dBm/95.04 MHz Note3 | -58.76 | -58.76 |
| 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: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 4: 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 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | |

##### A.17.11.1.1.2 Test Requirements

The RSTD measurement accuracy shall fulfil the absolute requirement in clause 10.1A.16.2.

## **--- End of Change # 72---**

## **--- Start of Change # 73 ---**

#### A.17.11.2.1 PRS-RSRP measurement accuracy test case for RedCap UE in FR2 in RRC\_IDLE state

##### A.17.11.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRP measurement accuracy for 2Rx RedCap UE in RRC\_IDLE is within the specified limits in FR2. This test will verify the requirements in clauses 10.1A.17.2.1 and 10.1A.17.2.2, when the PRS-RSRP measurement is performed without RX FH.

##### A.17.11.2.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.17.11.2.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.17.11.2.1.2-2 and A.17.11.2.1.2-3. In all test cases, Cell 1 is the PCell.

Table A.17.11.2.1.2-1: PRS-RSRP supported test configurations

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

Table A.17.11.2.1.2-2: PRS-RSRP 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 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Downlink initial BWP configuration |  | DLBWP.0.1 | - | DLBWP.0.1 | - |
| Uplink initial BWP configuration |  | ULBWP.0.1 | - | ULBWP.0.1 | - |
| DRX cycle configuration |  | 1.28s | - | 1.28s | - |
| 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.1 | OP.1 | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 RedCap | SMTC.1  RedCap | SMTC.1  RedCap | SMTC.1  RedCap |
| Time offset with Cell 1 | μs | - | 3 | - | 3 |
| PRS configuration |  | PRS.1.3 FR2 | PRS.1.3 FR2 | PRS.1.5 FR2 | PRS.1.5 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 |  | AWGN | AWGN | AWGN | AWGN |
| 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. | | | | | |

Table A.17.11.2.1.2-3: PRS-RSRP 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 6 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote3 | -98 | | Same as Test 1 | |
| Note1 | dBm/SCSNote3 | -89 | | Same as Test 1 | |
|  | dB | -2 | -10 | -2 | -10 |
| Es | dBm/SCSNote3 | - | - | - | - |
| PRS\_RPNote2 | dBm/SCS | -91 | -99 | -91 | -99 |
| BB Note5 | dB | -2.41 | -12.12 | -2.41 | -12.12 |
| IoNote2 | dBm/95.04 MHz Note3 | -57.63 | | -57.63 | |
| 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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.  NOTE 5: 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 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | |

A.17.11.2.1.3 Test Requirements

In each test, the absolute PRS-RSRP measurement for each cell shall fulfil the absolute accuracy requirement in clause 10.1A.17.2.1 when the PRS-RSRP measurement is performed without RX FH and if the reported PRS-RSRP is in the range shown in table A.17.11.2.1.3-1. The relative PRS-RSRP measurement between the two PRS resources within the same cell shall fulfil the relative accuracy requirement in clause 10.1A.17.2.2 when the PRS-RSRP measurement is performed without RX FH.

Table A.17.11.2.1.3-1: PRS-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| Cell 1 | PRS\_RP1 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP1 +δ +Gmax |
| Cell 2 | PRS\_RP2 -δ +Gmin ≤ Reported RSRP(dBm) ≤ PRS\_RP2 +δ +Gmax |
| NOTE 1: PRS\_RPn 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 RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, 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 # 73 ---**