**3GPP TSG-RAN WG4 Meeting #103-e *R4-2211240***

**Online, 9th May – 20th May, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **xxx** | **rev** | **-** | **Current version:** | **16.11.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Big CR for TS 38.133 Perf Maintenance Part-2 (Rel-16) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MCC, Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | - | | | | |  | ***Date:*** | | | 2022-5-24 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Big CR to merge the multiple endorsed/agreed CRs in RAN4#103e meeting for RRM performance maintenance part-2.   * R4-2208907 Correction to cell reselection test case\_r16 * R4-2210979 Correction to eMIMO BFD test cases\_r16 * R4-2210981 DraftCR on maintaining L1-SINR measurement test cases R16 * R4-2209076 draft CR: Correction of NR-U RRM test cases * R4-2209078 draft CR: Correction of PRACH configuration parameter for inter-RAT test * R4-2211212 CR on accuracy requirements for positioning measurement R16 * R4-2209610 Draft CR to TS 38.133: Corrections to intra-frequency event triggered test cases (Rel 16) * R4-2209613 Draft CR to TS 38.133: Corrections to beam failure and link recovery test cases (Rel 16) * R4-2210091 Draft CR 38.133 on DAPS handover test case * R4-2210983 Updates to accuracy requirements for UE positioning measurements in TS 38.133 * R4-2208342 CR to maintain test case of PScell addition and release delay (A4.5.7)\_R16 * R4-2210980 Update to UL switching test cases | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The summary of change in each endorsed/agreed CR are copied below.   * R4-2208907 Correction to cell reselection test case\_r16   + SnonintrasearchP is set to not present * R4-2210979 Correction to eMIMO BFD test cases\_r16   + Missing test parameters are added for eMIMO BFD TCs:     - initial/dedicated BWP RMC;     - dedicated CORESET RMC;     - PDSCH RMC;     - BW and data allocated RBs     - CSI reporting configuration   + Test configuration 2 (LTE TDD + NR FDD, 120k SCS) is added for EN-DC TCs   + 2X2 Antenna configuration is removed.   + CSI reporting periodicity is changed to 5ms.   + PRACH RMC is changed to Config.4 FR2.   + SR offset for SCell BFR is changed to 4.   + Test parameters are updated. * R4-2210981 DraftCR on maintaining L1-SINR measurement test cases R16   + To define the beam assumption in sections A.5.6.6.1 and A.5.6.6.2.   + To correct the value of Io in some FR2 L1-SINR measurement test cases * R4-2209076 draft CR: Correction of NR-U RRM test cases   + Change 1: Correction of parameter table for NR-U BFD test.   + Changes 2 and 3: Removal of []. * R4-2209078 draft CR: Correction of PRACH configuration parameter for inter-RAT test   + Correction of E-UTRAN PRACH configuration index configuration     - For test configurations 1, 2, and 3, set to 53.     - For test configurations 4, 5, and 6, set to 4. * R4-2211212 CR on accuracy requirements for positioning measurement R16   + Add the group delay calibration margin for remaining BWs in RSTD requirements.   + Update the PRS repetition number to 4 for the smallest BW in RSTD accuracy requirements for FR2 AWGN. * R4-2209610 Draft CR to TS 38.133: Corrections to intra-frequency event triggered test cases (Rel 16)   + In all intra-frequency event triggerend measurement test cases, set the connection-related transmission parameters (RMC, TRS) for the neighbour cell to N/A. * R4-2209613 Draft CR to TS 38.133: Corrections to beam failure and link recovery test cases (Rel 16)   + In FR1 BFD-LR test cases (A.4.5.5, A.6.5.5), dedicated CORESET RMCs have been added, while the current CORESET RMCs have been specified to be RMSI CORESET RMCs. * R4-2210091 Draft CR 38.133 on DAPS handover test case   + Including missing information on CSI report used for DAPS handover test case and correcting some typos in the same test case. * R4-2210983 Updates to accuracy requirements for UE positioning measurements in TS 38.133   + The following aspects of the UE Rx-Tx measurement requirements are added/updated:     - UE Rx-Tx measurement accuracy applicability under uplink transmission timing changes during the UE Rx-Tx measurement period due to the autonomous timing adjustment. The UE behavior is defined based on option 2 WF in R4-2206821.     - PRS repetition number to 4 for the smallest BW in RSTD and UE Rx-Tx accuracy requirements for FR2 AWGN * R4-2208342 CR to maintain test case of PScell addition and release delay (A4.5.7)\_R16   + Modify the incorrect event: from event A4 to event B1. * R4-2210980 Update to UL switching test cases   + Adding specific rows for RSRP and Io on symbols with CSI-RS   + Some editorial changes are made. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The summary in each endorsed/agreed CR are copied below.   * R4-2208907 Correction to cell reselection test case\_r16   + Conformant UE may fail the test. * R4-2210979 Correction to eMIMO BFD test cases\_r16   + eMIMO BFD test cases are incorrect. * R4-2210981 DraftCR on maintaining L1-SINR measurement test cases R16   + The FR2 L1-SINR measurement test cases are not correctly defined. * R4-2209076 draft CR: Correction of NR-U RRM test cases   + RAN5 may misunderstand the test parameters. * R4-2209078 draft CR: Correction of PRACH configuration parameter for inter-RAT test   + RAN5 cannot configure the correct parameter. * R4-2211212 CR on accuracy requirements for positioning measurement R16   + RSTD accuracy requirements are incomplete. * R4-2209610 Draft CR to TS 38.133: Corrections to intra-frequency event triggered test cases (Rel 16)   + Redundant parameters for the neighbour cell will complicate unnecessarily the test implementaion.   + Inconsistency between intra- and inter-frequency test cases. * R4-2209613 Draft CR to TS 38.133: Corrections to beam failure and link recovery test cases (Rel 16)   + Missing dedicated CORESET RMCs will make the implementation of test cases ambiguous. * R4-2210091 Draft CR 38.133 on DAPS handover test case   + DAPS handover test case will contain missing information and some errors. * R4-2210983 Updates to accuracy requirements for UE positioning measurements in TS 38.133   + UE Rx-Tx measurement accuracy requirement and UE behaviour will be undefined * R4-2208342 CR to maintain test case of PScell addition and release delay (A4.5.7)\_R16   + The test case for Addition and Release Delay of known NR PSCell are not clear. * R4-2210980 Update to UL switching test cases   + The CSI-RS configuration is not clear enough. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 10.1.23.2, 10.1.25.2, A.4.5.5, A.4.5.7.1, A.4.5.8, A.4.6.1, A.5.5.5.6, A.5.5.5.7, A.5.6.1, A.5.6.6.1, A.5.6.6.2, A.5.7.6.1, A.5.7.6.2, A.5.7.6.3, A.6.1.2.2, A.6.3.1.7 - A.6.3.1.12, A.6.5.5, A.6.5.7.1, A.6.5.7.2, A.6.6.1, A.7.3.1.4, A.7.3.1.5, A.7.5.5.6, A.7.5.5.7, A.7.6.1, A.7.6.6.2, A.7.7.6.1, A.7.7.6.2, A.7.7.6.3, A.10.3.4, A.10.4.3, A.11.5.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**< Start of change 1 (from - R4-2211212) >**

10.1.23.2 Measurement Accuracy Requirements

The accuracy requirements for RSTD measurement shall be within ±(X+Y) Tc.

X is defined in Table 10.1.23.2-1 for AWGN channel and Table 10.1.23.2-3 for fading channel for FR1, provided that the following conditions are met.

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for RSTD measurements are fulfilled according to Annex B.2.14 for a corresponding Band for each relevant PRS resource configured for measurement.

X is defined in Table 10.1.23.2-2 for AWGN channel and Table 10.1.23.2-4 for fading channel for FR2, provided that the following conditions are met.

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for RSTD measurements are fulfilled according to Annex B.2.14 for a corresponding Band for each relevant PRS resource configured for measurement.

Note: The requriements 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.

When UE measures RSTD on PRS resources belonging to different PFLs, then the RSTD accuracy is defined as the accuracy corresponding to the largest accuracy value among different PFLs.

When UE measures RSTD on PRS resources belonging to same PFL, Y=32 Tc, provided that the time offset between the two PRS resource instances from the reference cell and the neighbor cell, which are used for a single RSTD estimate, is no greater than 160 ms.

When UE measures RSTD on PRS resources belonging different PFLs, Y=[256] Tc, provided that the time offset between the two PRS resource instances from the reference cell and the neighbor cell, which are used for a single RSTD estimate, is no greater than [1280] ms.

[*Editor notes: The margins for measurements on different PFLs shall be considered in the group delay margin]*

*Editor’s Note: FFS whether and how to form the accuracy numbers considering enhanced requirements in future releases, e.g. capturing margin values in separate tables.*

**Table 10.1.23.2-1: RSTD absolute accuracy in FR1 for AWGN channel**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **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** |
| [252] +ΔNote 7 | (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 | -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 | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| [170] +Δ | ≥ [52] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [78] +Δ | ≥ [104] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [147] +Δ | 30 | ≥ [24] | ≥ [4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -118 | -50 |
| NR\_FDD\_FR1\_B | -117.5 | -50 |
| NR\_TDD\_FR1\_C | -117 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -116.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -116 | -50 |
| NR\_FDD\_FR1\_F | -115.5 | -50 |
| NR\_FDD\_FR1\_G | -115 | -50 |
| NR\_FDD\_FR1\_H | -114.5 | -50 |
| [84] +Δ | ≥ [48] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [40] +Δ | ≥ [132] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [86] +Δ | 60 | ≥ [24] | ≥ [4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -115 | -50 |
| NR\_FDD\_FR1\_B | -114.5 | -50 |
| NR\_TDD\_FR1\_C | -114 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -113.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -113 | -50 |
| NR\_FDD\_FR1\_F | -113.5 | -50 |
| NR\_FDD\_FR1\_G | -113 | -50 |
| NR\_FDD\_FR1\_H | -111.5 | -50 |
| [40] +Δ | ≥ [64] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [22] +Δ | ≥ [132] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| 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: Δ=TBD. | | | | | | | |

**Table 10.1.23.2-2: RSTD absolute accuracy in FR2 for AWGN channel**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | **Conditions** | | | | | |
| **PRS Ês/Iot** | **PRS SCS** | **PRS bandwidth**  **Note 1** | **PRS resource repetition**  **() Note 2** | **Io Note 3 range** | |
| **Minimum Io** | **Maximum Io** |
| **Tc Note 4** | **dB** | **kHz** | **RB** |  | **dBm/SCS** | **dBm/BWChannel** |
| [107] +ΔNote 6 | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 60 | ≥ [24] | ≥ [4] | Same value as PRS\_RP in Table B.2.z-2, according to UE Power class, operating band and angle of arrival | -50 |
| [56] +Δ | ≥ [64] | ≥ [1] | Note 5 | Note 5 |
| [27] +Δ | ≥ [132] | ≥ [1] | Note 5 | Note 5 |
| [56] +Δ | 120 | ≥ [32] | ≥ [4] | Same value as PRS\_RP in Table B.2.z-2, according to UE Power class, operating band and angle of arrival | -50 |
| [29] +Δ | ≥ [64] | ≥ [1] | Note 5 | Note 5 |
| [18] +Δ | ≥ [128] | ≥ [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: Δ=TBD. | | | | | | |

**Table 10.1.23.2-3: RSTD absolute accuracy in FR1 for fading channel**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **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** |
| [367] +ΔNote 7 | (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 | -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 | -118 | -50 |
| NR\_FDD\_FR1\_H | -117.5 | -50 |
| [212] +Δ | ≥ [52] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [122] +Δ | ≥ [104] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [190] +Δ | 30 | ≥ [24] | ≥ [4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -118 | -50 |
| NR\_FDD\_FR1\_B | -117.5 | -50 |
| NR\_TDD\_FR1\_C | -117 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -116.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -116 | -50 |
| NR\_FDD\_FR1\_F | -115.5 | -50 |
| NR\_FDD\_FR1\_G | -115 | -50 |
| NR\_FDD\_FR1\_H | -114.5 | -50 |
| [145] +Δ | ≥ [48] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [44] +Δ | ≥ [132] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [183] +Δ | 60 | ≥ [24] | ≥ [4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -115 | -50 |
| NR\_FDD\_FR1\_B | -114.5 | -50 |
| NR\_TDD\_FR1\_C | -114 | -50 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -113.5 | -50 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -113 | -50 |
| NR\_FDD\_FR1\_F | -113.5 | -50 |
| NR\_FDD\_FR1\_G | -113 | -50 |
| NR\_FDD\_FR1\_H | -111.5 | -50 |
| [43] +Δ | ≥ [64] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| [33] +Δ | ≥ [132] | ≥ [1] | Note 6 | Note 6 | Note 6 |
| 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: Δ=TBD. | | | | | | | |

**Table 10.1.23.2-4: RSTD absolute accuracy in FR2 for fading channel**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | **Conditions** | | | | | |
| **PRS Ês/Iot** | **PRS SCS** | **PRS bandwidth**  **Note 1** | **PRS resource repetition**  **() Note 2** | **Io Note 3 range** | |
| **Minimum Io** | **Maximum Io** |
| **Tc Note 4** | **dB** | **kHz** | **RB** |  | **dBm/SCS** | **dBm/BWChannel** |
| [155] +ΔNote 6 | (PRS Ês/Iot)ref ≥-6dB  (PRS Ês/Iot)*i* ≥-13dB | 60 | ≥ [24] | ≥ [4] | Same value as PRS\_RP in Table B.2.z-2, according to UE Power class, operating band and angle of arrival | -50 |
| [96] +Δ | ≥ [64] | ≥ [1] | Note 5 | Note 5 |
| [62] +Δ | ≥ [132] | ≥ [1] | Note 5 | Note 5 |
| [80] +Δ | 120 | ≥ [32] | ≥ [4] | Same value as PRS\_RP in Table B.2.z-2, according to UE Power class, operating band and angle of arrival | -50 |
| [70] +Δ | ≥ [64] | ≥ [1] | Note 5 | Note 5 |
| [48] +Δ | ≥ [128] | ≥ [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: Δ=TBD. | | | | | | |

**< End of change 1>**

**< Start of change 2 (from - R4-2210983) >**

10.1.25.2 Measurement Accuracy Requirements

The UE Rx-Tx time difference measurement accuracy requirements in this clause shall not apply, if:

NTA\_offset defined in Table 7.1.2-2 changes during the UE Rx-Tx measurement period or

if the uplink transmission timing changes during the UE Rx-Tx measurement period due to the network-configured Timing Advance.

The UE Rx-Tx time difference measurement accuracy requirements in this clause shall apply provided that:

- The UE transmits SRS within [-160, 160] msec of at least one DL PRS resource of each of the TRPs in the assistance data.

If the uplink transmission timing changes during the UE Rx-Tx measurement period due to the autonomous timing adjustment defined in clause 7.1.2 then:

* UE Rx-Tx measurement accuracy requirements shall apply for a cell, which is also the downlink reference cell (defined in section 7.1.1) for SRS transmission even if the uplink transmission timing changes during the UE Rx-Tx measurement period due to autonomous adjustment.
* UE Rx-Tx measurement accuracy requirements shall not apply for a cell, which is not the downlink reference cell (defined in section 7.1.1) for SRS transmission, if the uplink transmission timing changes during the UE Rx-Tx measurement period due to autonomous adjustment. The UE may restart the UE Rx-Tx measurement in this case.

The UE shall continue and complete a UE Rx-Tx measurement while meeting UE Rx-Tx measurement accuracy requirements defined in this clause when a serving cell change occurs during the UE Rx-Tx measurement provided that the serving cell change does not impact the SRS configuration for the UE Rx-Tx measurement.

Note: The requriements 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.

*Editor’s note: In accuracy tables δ is margin and is FFS*

The accuracy requirements in Table 10.1.25.2-1 for FR1 are valid under the following conditions:

Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

PRP|dBm according to Annex B.2.14 for a corresponding Band.

AWGN propagation condition.

**Table 10.1.25.2-1: UE Rx-Tx time difference measurement accuracy in FR1 in AWGN**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | **Conditions** | | | | | | |
| **PRS Ês/Iot** | **Minimum PRS bandwidth** | **PRS SCS** | **PRS resource repetition Note 3** | **NR operating band groupsNote 2** | **IoNote 4 range** | |
| **Minimum IoNote 1** | **Maximum Io** |
| **TcNote 5** | **dB** | **RB** | **kHz** |  |  | **dBm / SCSPRS** | **dBm/BW** |
| ± [78+δ] | -3 | ≥[24] | 15 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -120.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -120 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -118.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -118 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -117.5 |  |
| ± [59+80] |  | ≥[52] |  | ≥[1] | Note 6 | Note 6 | Note 6 |
| ± [30+56] |  | >[104] |  | ≥[1] | Note 6 | Note 6 | Note 6 |
| ± [57+80] |  | ≥[24] | 30 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -118 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -117.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -117 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -116.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -116 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -115.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -115 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -114.5 |  |
| ± [30+56] |  | ≥[48] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [15+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [29+56] |  | ≥[24] | 60 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -115 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -114.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -114 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -113.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -113 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -113.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -113 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -111.5 |  |
| ± [15+24] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [7+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [101+δ] | -13 | ≥[24] | 15 | ≥[4] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [75+80] |  | ≥[52] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [37+56] |  | >[104] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [58+80] |  | ≥[24] | 30 | ≥[4] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [39+56] |  | ≥[48] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [16+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [36+56] |  | ≥[24] | 60 | ≥[4] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [16+24] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [8+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  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. | | | | | | | |

The accuracy requirements in Table 10.1.25.2-2 for FR1 are valid under the following conditions:

Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.

PRP|dBm according to Annex B.2.14 for a corresponding Band.

Fading propagation condition.

**Table 10.1.25.2-2: UE Rx-Tx time difference measurement accuracy in FR1 in fading**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | **Conditions** | | | | | | |
| **PRS Ês/Iot** | **Minimum PRS bandwidth** | **PRS SCS** | **PRS resource repetition Note 3** | **NR operating band groupsNote 2** | **IoNote 4 range** | |
| **Minimum IoNote 1** | **Maximum Io** |
| **TcNote 5** | **dB** | **RB** | **kHz** |  |  | **dBm / SCSPRS** | **dBm/BW** |
| ± [137+δ] | -3 | ≥[24] | 15 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -121 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -120.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -120 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -119.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -119 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -118.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -118 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -117.5 |  |
| ± [96+80] |  | ≥[52] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [62+56] |  | >[104] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [87+80] |  | ≥[24] | 30 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -118 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -117.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -117 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -116.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -116 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -115.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -115 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -114.5 |  |
| ± [68+56] |  | ≥[48] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [44+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [59+56] |  | ≥[24] | 60 | ≥[4] | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A,  NR\_SDL\_FR1\_A | -115 | -50 |
|  |  |  |  |  | NR\_FDD\_FR1\_B | -114.5 |  |
|  |  |  |  |  | NR\_TDD\_FR1\_C | -114 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -113.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -113 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_F | -113.5 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_G | -113 |  |
|  |  |  |  |  | NR\_FDD\_FR1\_H | -111.5 |  |
| ± [42+24] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [36+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [180+δ] |  | ≥[24] |  | ≥[4] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [98+80] | -13 | ≥[52] | 15 | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [68+56] |  | >[104] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [87+80] |  | ≥[24] | 30 | ≥[4] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [85+56] |  | ≥[48] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [44+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [139+56] |  | ≥[24] | 60 | ≥[4] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [46+24] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| ± [30+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  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. | | | | | | | |

The accuracy requirements in Table 10.1.25.2-3 for FR2 are valid under the following conditions:

Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

PRP|dBm according to Annex B.2.14 for a corresponding Band.

AWGN propagation condition.

**Table 10.1.25.2-3: UE Rx-Tx time difference measurement accuracy in FR2 in AWGN**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | **Conditions** | | | | | |
| **PRS Ês/Iot** | **Minimum PRS bandwidth** | **PRS SCS** | **PRS resource repetitionNote 3** | **IoNote 4 range** | |
| **Minimum IoNote 1** | **Maximum Io** |
| **TcNote 5** | **dB** | **RB** | **kHz** |  | **dBm / SCSPRS** | **dBm/BWChannel** |
| ± [22+76] | -3 | ≥[24] | 60 | ≥[4] | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± [15+32] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [7+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [12+32] |  | ≥[32] | 120 | ≥[1] | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± [7+24] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [4+20] |  | ≥[128] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [35+76] | -13 | ≥[24] | 60 | ≥[1] | NOTE 6 | NOTE 6 |
| ± [15+32] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [7+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [14+32] |  | ≥[32] | 120 | ≥[1] | NOTE 6 | NOTE 6 |
| ± [9+24] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [4+20] |  | ≥[128] |  | ≥[1] | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeNdefined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  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. | | | | | | |

The accuracy requirements in Table 10.1.25.2-4 for FR2 are valid under the following conditions:

Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

PRP|dBm according to Annex B.2.14 for a corresponding Band.

Fading propagation condition.

**Table 10.1.25.2-4: UE Rx-Tx time difference measurement accuracy in FR2 in fading**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Accuracy** | **Conditions** | | | | | |
| **PRS Ês/Iot** | **Minimum PRS bandwidth** | **PRS SCS** | **PRS resource repetitionNote 3** | **IoNote 4 range** | |
| **Minimum IoNote 1** | **Maximum Io** |
| **TcNote 5** | **dB** | **RB** | **kHz** |  | **dBm / SCSPRS** | **dBm/BWChannel** |
| ± [75+76] | -3 | ≥[24] | 60 | ≥[4] | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± [72+32] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [57+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [61+32] |  | ≥[32] | 120 | ≥[1] | Same value as PRP in Table B.2.14-2, according to UE Power class, operating band and angle of arrival | -50 |
| ± [64+24] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [55+20] |  | ≥[128] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [92+76] | -13 | ≥[24] | 60 | ≥[4] | NOTE 6 | NOTE 6 |
| ± [70+32] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [57+24] |  | ≥[132] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [60+32] |  | ≥[32] | 120 | ≥[1] | NOTE 6 | NOTE 6 |
| ± [66+24] |  | ≥[64] |  | ≥[1] | NOTE 6 | NOTE 6 |
| ± [62+20] |  | ≥[128] |  | ≥[1] | NOTE 6 | NOTE 6 |
| NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.  NOTE 2: NR operating band groups are as defined in Section 3.5.  NOTE 3: are configured by higher layer parameter *dl-PRS-ResourceRepetitionFactor, dl-PRS-NumSymbols and dl-PRS-CombSizeN*defined in TS 37.355 [34].  NOTE 4: The Io is defined in PRS slots. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same slot.  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. | | | | | | |

**< End of change 2>**

**< Start of change 3 (from - R4-2209613) >**

**< Unchanged sections omitted >**

Table A.4.5.5.1.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Value | Comment |
|  | | | | |  | Test 1 |  |
| Active E-UTRA PCell | | | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | | | |  | 1 |  |
| Active PSCell | | | | |  | Cell 2 |  |
| RF Channel Number | | | | |  | 2 |  |
| Duplex mode | | | | Config 1, 4 |  | FDD |  |
|  | | | | Config 2, 3, 5, 6 |  | TDD |  |
| BWchannel | | | | Config 1, 4 | MHz | 10: NRB,c = 52 |  |
|  | | | | Config 2, 5 |  | 10: NRB,c = 52 |  |
|  | | | | Config 3, 6 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |  |
| TDD | | | | Config 1, 4 |  | Not Applicable |  |
| Configuration | | | | Config 2, 5 |  | TDDConf.1.1 |  |
|  | | | | Config 3, 6 |  | TDDConf.2.1 |  |
| RMSI CORESET | | | | Config 1, 4 |  | CR.1.1 FDD |  |
| Reference | | | | Config 2, 5 |  | CR.1.1 TDD |  |
| Channel | | | | Config 3, 6 |  | CR.2.1 TDD |  |
| Dedicated CORESET | | | | Config 1, 4 |  | CCR.1.1 FDD |  |
| Reference | | | | Config 2, 5 |  | CCR.1.1 TDD |  |
| Channel | | | | Config 3, 6 |  | CCR.2.1 TDD |  |
| SSB | | | | Config 1, 4 |  | SSB.3 FR1 |  |
| Configuration | | | | Config 2, 5 |  | SSB.3 FR1 |  |
|  | | | | Config 3, 6 |  | SSB.4 FR1 |  |
| SMTC Configuration | | | | Config 1, 2, 4, 5 |  | SMTC.1 |  |
|  | | | | Config 3, 6 |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier | | | | Config 1, 2, 4, 5 |  | 15 KHz |  |
| spacing | | | | Config 3, 6 |  | 30 KHz |  |
| PRACH Configuration | | | | Config 1, 2, 4, 5 |  | Table A.3.8.2.2-1 |  |
|  | | | | Config 3, 6 |  | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low |  |
| Beam failure | | DCI format | | |  | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols | | |  | 2 |  |
|  | | Aggregation level | | | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size |  |
|  | | REG bundle size | | |  | 6 |  |
| DRX | | | | |  | OFF |  |
| Gap pattern ID | | | | |  | gp0 |  |
| gapOffset | | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2, 4, 5 | | | | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
|  | Config 3, 6 | | | |  | -95 |  |
| powerControlOffsetSS | | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS | | | Config 1, 4 | |  | CSI-RS.1.1 FDD |  |
| configuration for | | | Config 2, 5 | |  | CSI-RS.1.1 TDD |  |
| CSI reporting | | | Config 3, 6 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for | | | Config 1, 4 | |  | TRS.1.1 FDD |  |
| tracking | | | Config 2, 5 | |  | TRS.1.1 TDD |  |
|  | | | Config 3, 6 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | | | |  | 0,1 |  |
| T310 timer | | | | | ms | 1000 |  |
| N310 | | | | |  | 2 |  |
| T1 | | | | | s | 0.2 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | 0.37 |  |
| T3 | | | | | s | 0.24 |  |
| T4 | | | | | s | 0 |  |
| T5 | | | | | s | 0.17 |  |
| D1 | | | | | s | 0.13 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | | | | |

**< End of change 3>**

**< Start of change 4 (from - R4-2209613) >**

**< Unchanged sections omitted >**

Table A.4.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
|  | | |  | Test 1 |  |
| Active E-UTRA PCell | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | |  | 1 |  |
| Active PSCell | | |  | Cell 2 |  |
| RF Channel Number | | |  | 2 |  |
| Duplex mode | Config 1, 4 | |  | FDD |  |
|  | Config 2, 3, 5, 6 | |  | TDD |  |
| BWchannel | Config 1, 4 | | MHz | 10: NRB,c = 52 |  |
|  | Config 2, 5 | |  | 10: NRB,c = 52 |  |
|  | Config 3, 6 | |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | DLBWP.1.1 |  |
| UL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | ULBWP.1.1 |  |
| TDD Configuration | Config 1, 4 | |  | Not Applicable |  |
|  | Config 2, 5 | |  | TDDConf.1.1 |  |
|  | Config 3, 6 | |  | TDDConf.2.1 |  |
| RMSI CORESET Reference | Config 1, 4 | |  | CR.1.1 FDD |  |
| Channel | Config 2, 5 | |  | CR.1.1 TDD |  |
|  | Config 3, 6 | |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference | Config 1, 4 | |  | CCR.1.1 FDD |  |
| Channel | Config 2, 5 | |  | CCR.1.1 TDD |  |
|  | Config 3, 6 | |  | CCR.2.1 TDD |  |
| SSB Configuration | Config 1, 4 | |  | SSB.3 FR1 |  |
|  | Config 2, 5 | |  | SSB.3 FR1 |  |
|  | Config 3, 6 | |  | SSB.4 FR1 |  |
| SMTC Configuration | Config 1, 2, 4, 5 | |  | SMTC.1 |  |
|  | Config 3, 6 | |  | SMTC.1 |  |
| PDSCH/PDCCH | Config 1, 2, 4, 5 | |  | 15 KHz |  |
| subcarrier spacing | Config 3, 6 | |  | 30 KHz |  |
| PRACH Configuration | Config 1, 2, 4, 5 | |  | Table A.3.8.2.2-1 |  |
|  | Config 3, 6 | |  | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | |  | 1 |  |
| OCNG parameters | | |  | OP.1 |  |
| CP length | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |  |
| Beam failure detection | DCI format | |  | 1-0 |  |
| transmission parameters | Number of Control OFDM symbols | |  | 2 |  |
|  | Aggregation level | | CCE | 8 |  |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |  |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |  |
|  | DMRS precoder granularity | |  | REG bundle size |  |
|  | REG bundle size | |  | 6 |  |
| DRX | | |  | DRX.7 | A.3.3.7 |
| Gap pattern ID | | |  | N.A. |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2, 4, 5 | | dBm/SCS kHz | -98 | Threshold used for |
|  | Config 3, 6 | |  | -95 | Qin\_LR\_SSB |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | Config 1, 4 |  | CSI-RS.1.1 FDD |  |
|  | | Config 2, 5 |  | CSI-RS.1.1 TDD |  |
|  | | Config 3, 6 |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | Config 1, 4 |  | TRS.1.1 FDD |  |
|  | | Config 2, 5 |  | TRS.1.1 TDD |  |
|  | | Config 3, 6 |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | |  | 0,1 |  |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 5.17 |  |
| T3 | | | s | 3.24 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 1.97 |  |
| D1 | | | s | 1.93 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | | |

**< End of change 4>**

**< Start of change 5 (from - R4-2209613) >**

**< Unchanged sections omitted >**

Table A.4.5.5.3.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
|  | | |  | Test 1 |  |
| Active PCell | | |  | Cell 1 |  |
| RF Channel Number | | |  | 1 |  |
| Active PSCell | | |  | Cell 2 |  |
| RF Channel Number | | |  | 2 |  |
| Duplex mode | | Config 1, 4 |  | FDD |  |
|  | | Config 2, 3, 5, 6 |  | TDD |  |
| BWchannel | | Config 1, 4 | MHz | 10: NRB,c = 52 |  |
| Config 2, 5 |  | 10: NRB,c = 52 |  |
| Config 3, 6 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |  |
| TDD Configuration | | Config 1, 4 |  | Not Applicable |  |
|  | | Config 2, 5 |  | TDDConf.1.1 |  |
|  | | Config 3, 6 |  | TDDConf.2.1 |  |
| RMSI CORESET | | Config 1, 4 |  | CR.1.1 FDD | A.3.1.2 |
| Reference Channel | | Config 2, 5 |  | CR.1.1 TDD |  |
|  | | Config 3, 6 |  | CR.2.1 TDD |  |
| Dedicated CORESET | | Config 1, 4 |  | CCR.1.1 FDD | A.3.1.3 |
| Reference Channel | | Config 2, 5 |  | CCR.1.1 TDD |  |
|  | | Config 3, 6 |  | CCR.2.1 TDD |  |
| SSB Configuration | | Config 1, 4 |  | SSB.3 FR1 | A.3.10 |
|  | | Config 2, 5 |  | SSB.3 FR1 |  |
|  | | Config 3, 6 |  | SSB.4 FR1 |  |
| SMTC | | Config 1, 2, 4, 5 |  | SMTC.1 | A.3.11 |
| Configuration | | Config 3, 6 |  | SMTC.1 |  |
| PDSCH/PDCCH | | Config 1, 2, 4, 5 |  | 15 KHz |  |
| subcarrier spacing | | Config 3, 6 |  | 30 KHz |  |
| PRACH Configuration | | Config 1, 2, 4, 5 |  | FR1 PRACH configuration 4 | A.3.8.2 |
| Config 3, 6 | FR1 PRACH configuration 4 | A.3.8.2 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | | |  | 0 |  |
| OCNG parameters | | |  | OP.1 | A.3.2.1 |
| CP length | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |  |
| Beam failure | | DCI format |  | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols |  | 2 |  |
|  | | Aggregation level | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
|  | | DMRS precoder granularity |  | REG bundle size |  |
|  | | REG bundle size |  | 6 |  |
| DRX | | |  | OFF |  |
| Gap pattern ID | | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp- | Config 1, 2, 4, 5 | | dBm/SCS | -98 | Threshold used |
| ThresholdSSB | Config 3, 6 | | kHz | -95 | for Qin\_LR\_SSB |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS | | Config 1, 4 |  | CSI-RS.1.2 FDD | A.3.14 |
| configuration for q0 | | Config 2, 5 |  | CSI-RS.1.2 TDD |  |
| and q1 | | Config 3, 6 |  | CSI-RS.2.2 TDD |  |
| CSI-RS | | Config 1, 4 |  | CSI-RS.1.1 FDD | A.3.14 |
| configuration for | | Config 2, 5 |  | CSI-RS.1.1 TDD |  |
| CSI reporting | | Config 3, 6 |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | Config 1, 4 |  | TRS.1.1 FDD |  |
|  | | Config 2, 5 |  | TRS.1.1 TDD |  |
|  | | Config 3, 6 |  | TRS.1.2 TDD |  |
| csi-RS-Index | | Config 1, 4 |  | CSI-RS.1.2 FDD | A.3.14 |
| assigned as RLM | | Config 2, 5 |  | CSI-RS.1.2 TDD |  |
| RS | | Config 3, 6 |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 0.18 |  |
| T3 | | | s | 0.14 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 0.08 |  |
| D1 | | | s | 0.04 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

**< End of change 5>**

**< Start of change 6 (from - R4-2209613) >**

**< Unchanged sections omitted >**

Table A.4.5.5.4.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value | Comment |
|  | | | |  | Test 1 |  |
| Active PCell | | | |  | Cell 1 |  |
| RF Channel Number | | | |  | 1 |  |
| Active PSCell | | | |  | Cell 2 |  |
| RF Channel Number | | | |  | 2 |  |
| Duplex mode | | | Config 1, 4 |  | FDD |  |
|  | | | Config 2, 3, 5, 6 |  | TDD |  |
| BWchannel | | | Config 1, 4 | MHz | 10: NRB,c = 52 |  |
| Config 2, 5 |  | 10: NRB,c = 52 |  |
| Config 3, 6 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |  |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |  |
|  | | | Config 2, 5 |  | TDDConf.1.1 |  |
|  | | | Config 3, 6 |  | TDDConf.2.1 |  |
| RMSI CORESET Reference | | | Config 1, 4 |  | CR.1.1 FDD | A.3.1.2 |
| Channel | | | Config 2, 5 |  | CR.1.1 TDD |  |
|  | | | Config 3, 6 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference | | | Config 1, 4 |  | CCR.1.1 FDD | A.3.1.3 |
| Channel | | | Config 2, 5 |  | CCR.1.1 TDD |  |
|  | | | Config 3, 6 |  | CCR.2.1 TDD |  |
| SSB Configuration | | | Config 1, 4 |  | SSB.3 FR1 | A.3.10 |
|  | | | Config 2, 5 |  | SSB.3 FR1 |  |
|  | | | Config 3, 6 |  | SSB.4 FR1 |  |
| SMTC Configuration | | | Config 1, 2, 4, 5 |  | SMTC.1 | A.3.11 |
|  | | | Config 3, 6 |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2, 4, 5 |  | 15 KHz |  |
|  | | | Config 3, 6 |  | 30 KHz |  |
| PRACH Configuration | | | Config 1, 2, 4, 5 |  | FR1 PRACH configuration 4 | A.3.8.2 |
| Config 3, 6 | FR1 PRACH configuration 4 | A.3.8.2 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | | | |  | 0 |  |
| OCNG parameters | | | |  | OP.1 | A.3.2.1 |
| CP length | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |  |
| Beam failure detection | | | DCI format |  | 1-0 |  |
| transmission parameters | | | Number of Control OFDM symbols |  | 2 |  |
|  | | | Aggregation level | CCE | 8 |  |
|  | | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
|  | | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
|  | | | DMRS precoder granularity |  | REG bundle size |  |
|  | | | REG bundle size |  | 6 |  |
| DRX | | | |  | DRX.7 | A.3.3.7 |
| Gap pattern ID | | | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | | | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2, 4, 5 | | | dBm/SCS kHz | -98 | Threshold used |
|  | Config 3, 6 | | |  | -95 | for Qin\_LR\_SSB |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for q0 and q1 | | Config 1, 4 | |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.2 TDD |  |
| CSI-RS configuration for CSI reporting | | Config 1, 4 | |  | CSI-RS.1.1 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.1 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | Config 1, 4 | |  | TRS.1.1 FDD |  |
|  | | Config 2, 5 | |  | TRS.1.1 TDD |  |
|  | | Config 3, 6 | |  | TRS.1.2 TDD |  |
| csi-RS-Index assigned as RLM RS | | Config 1, 4 | |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | | ms | 1000 |  |
| N310 | | | |  | 2 |  |
| T1 | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 8.37 |  |
| T3 | | | | s | 6.44 |  |
| T4 | | | | s | 0 |  |
| T5 | | | | s | 1.97 |  |
| D1 | | | | s | 1.93 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | |

**< End of change 6>**

**< Start of change 7 (from - R4-2210979) >**

#### A.4.5.5.5 EN-DC Beam Failure Detection and Link Recovery Test for FR1 SCell configured with CSI-RS-based BFD and SSB-based LR in non-DRX mode

##### A.4.5.5.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving SCell and that the UE performs correct SSB-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell without *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.5.1-1, A.4.5.5.5.1-2, and A.4.5.5.5.1-3 below. There are three cells, cell 1 is the E-UTRAN PCell, cell 2 is the PSCell and cell 3 is the SCell, in the test. UE is not provided by *schedulingRequestID-BFR-SCell-r16*, i.e., no configuration for PUCCH transmission resources, and UE shall perform the random access procedure to recover the beam failure. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.5.1-1 shows the SNR of the CSI-RS in set q0 in the active SCell to emulate beam failure. Figure A.4.5.5.5.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1, cell 2 and cell3. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.4.5.5.5.1-1: Supported test configurations for FR1 PCell and SCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.4.5.5.5.1-2: General test parameters for FR1 SCell for beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
|  | | |  | Test 1 |  |
| Active PCell | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | |  | 1 |  |
| Active PSCell | | |  | Cell 2 |  |
| RF Channel Number for PSCell | | |  | 2 |  |
| Active SCell | | |  | Cell 3 |  |
| RF Channel Number for SCell | | |  | 3 |  |
| Duplex mode | | Config 1, 4 |  | FDD |  |
|  | | Config 2, 3, 5, 6 |  | TDD |  |
| BW channel | | Config 1, 4 |  | 10: NRB,c = 52 |  |
| Config 2, 5 | MHz | 10: NRB,c = 52 |  |
| Config 3, 6 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |  |
| TDD Configuration | | Config 1, 4 |  | Not Applicable |  |
|  | | Config 2, 5 |  | TDDConf.1.1 |  |
|  | | Config 3, 6 |  | TDDConf.2.1 |  |
| CORESET | | Config 1, 4 |  | CR.1.1 FDD | A.3.1.2 |
| Reference Channel | | Config 2, 5 |  | CR.1.1 TDD |  |
|  | | Config 3, 6 |  | CR.2.1 TDD |  |
| SSB Configuration | | Config 1, 4 |  | SSB.1 FR1 | A.3.10 |
|  | | Config 2, 5 |  | SSB.1 FR1 |  |
|  | | Config 3, 6 |  | SSB.2 FR1 |  |
| SMTC Configuration | | Config 1, 2, 3, 4, 5, 6 |  | SMTC.1 | A.3.11 |
| PDSCH/PDCCH | | Config 1, 2, 4, 5 | kHz | 15 |  |
| subcarrier spacing | | Config 3, 6 |  | 30 |  |
| PRACH Configuration | | Config 1, 2, 4, 5 |  | Table A.3.8.2.2-1 |  |
| Config 3, 6 |  | Table A.3.8.2.2-1 |  |
| csi-RS-Index assigned as beam failure detection RS in set q0 in activated SCell | | |  | 0 |  |
| OCNG parameters | | |  | OP.1 | A.3.2.1 |
| CP length | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |  |
| Beam failure | | DCI format |  | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols |  | 2 |  |
|  | | Aggregation level | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
|  | | DMRS precoder granularity |  | REG bundle size |  |
|  | | REG bundle size |  | 6 |  |
| DRX | | |  | OFF |  |
| Gap pattern ID | | |  | N.A. |  |
| schedulingRequestID-BFR-SCell-r16 | | |  | absent | When the field is absent, the random access procedure will be triggered for SCell BFR |
| SSB Index assigned as CBD RS (q1) in activated SCell | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp- | Config 1, 2, 4, 5 | | dBm/SCS | -98 | Threshold used |
| ThresholdBFR | Config 3, 6 | |  | -95 | for Qin\_LR\_SSB |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS | | Config 1, 4 |  | CSI-RS.1.2 FDD | A.3.14 |
| configuration for q0 in activated SCell | | Config 2, 5 |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 |  | CSI-RS.2.2 TDD |  |
| CSI-RS | | Config 1, 4 |  | CSI-RS.1.1 FDD | A.3.14 |
| configuration for | | Config 2, 5 |  | CSI-RS.1.1 TDD |  |
| CSI reporting | | Config 3, 6 |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | Config 1, 4 |  | TRS.1.1 FDD |  |
|  | | Config 2, 5 |  | TRS.1.1 TDD |  |
|  | | Config 3, 6 |  | TRS.1.2 TDD |  |
| csi-RS-Index | | Config 1, 4 |  | CSI-RS.1.2 FDD | A.3.14 |
| assigned as RLM | | Config 2, 5 |  | CSI-RS.1.2 TDD |  |
| RS in PSCell | | Config 3, 6 |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 0.18 |  |
| T3 | | | s | 0.14 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 0.17 |  |
| D1 | | | s | 0.13 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.4.5.5.5.1-3: Cell specific test parameters for FR1 PSCell and SCell for beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | Test 1 Cell3 | | | | |
|  | |  | T1 to T5 | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1, 4 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
|  | Config 2, 5 |  | 5 | 5 | -3 | -12 | -12 | -12 |
|  | Config 3, 6 |  | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1, 4 | dB | -10 | -10 | -10 | 10 | 10 | 10 |
|  | Config 2, 5 |  | -10 | -10 | -10 | 10 | 10 | 10 |
|  | Config 3, 6 |  | -10 | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1, 4 | dBm/SCS kHz | -108 | -108 | -108 | -88 | -88 | -88 |
|  | Config 2, 5 |  | -108 | -108 | -108 | -88 | -88 | -88 |
|  | Config 3, 6 |  | -105 | -105 | -105 | -85 | -85 | -85 |
|  | Config 1, 4 | dBm/15 kHz | -98 | -98 | | | | |
|  | Config 2, 5 |  | -98 | -98 | | | | |
|  | Config 3, 6 |  | -98 | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6]. | | | | | | | | |

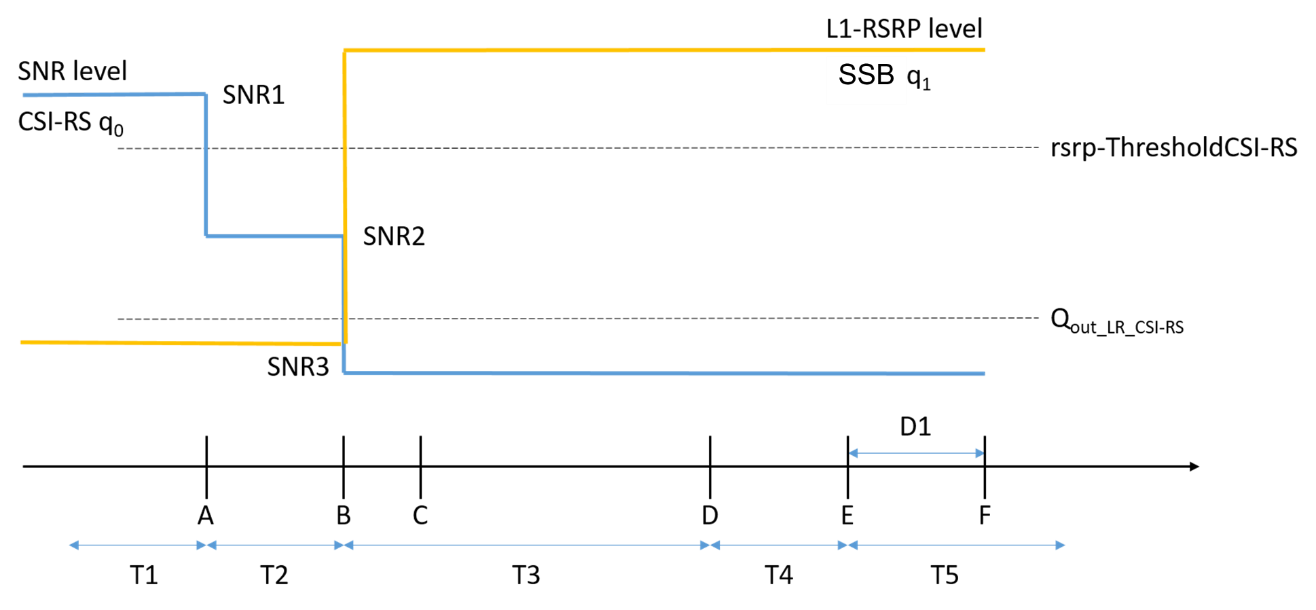


Figure A.4.5.5.5.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in non-DRX mode

##### A.4.5.5.5.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 2.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble for UL-SCH resource application, followed by MAC-CE on the assigned uplink resources containing  a beam associated with the candidate beam set q1. The UE shall not transmit preamble earlier than time point B.

During T5, the System Simulator shall transmit a Random Access Response to UE after the System Simulator receives the preamble from UE. The UE shall transmit the msg.3 containing candidate beam set q1 for SCell BFR if UE receives the Random Access Response.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.4.5.5.6 EN-DC Beam Failure Detection and Link Recovery Test for FR1 SCell configured with CSI-RS-based BFD and SSB-based LR in DRX mode

##### A.4.5.5.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS based beam failure in the set q0 configured for a serving SCell and that the UE performs correct SSB-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell without *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.6.1-1, A.4.5.5.6.1-2, and A.4.5.5.6.1-3below. There are three cells, cell 1 is the E-UTRAN PCell, cell 2 is the PSCell and cell 3 is the SCell, in the test. UE is not provided by *schedulingRequestID-BFR-SCell-r16*, i.e., no configuration for PUCCH transmission resources, and UE shall perform the random access procedure to recover the beam failure. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.6.1-1 shows the SNR of the CSI-RS in set q0 in the active SCell to emulate beam failure. Figure A.4.5.5.6.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1, cell 2 and cell 3. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in SCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.4.5.5.6.1-1: Supported test configurations for FR1 PCell and SCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.4.5.5.6.1-2: General test parameters for FR1 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value | Comment |
|  | | | |  | Test 1 |  |
| Active PCell | | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | | |  | 1 |  |
| Active PSCell | | | |  | Cell 2 |  |
| RF Channel Number for PSCell | | | |  | 2 |  |
| Active SCell | | | |  | Cell 3 |  |
| RF Channel Number for SCell | | | |  | 3 |  |
| Duplex mode | | | Config 1, 4 |  | FDD |  |
|  | | | Config 2, 3, 5, 6 |  | TDD |  |
| BW channel | | | Config 1, 4 |  | 10: NRB,c = 52 |  |
| Config 2, 5 | MHz | 10: NRB,c = 52 |  |
| Config 3, 6 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |  |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |  |
|  | | | Config 2, 5 |  | TDDConf.1.1 |  |
|  | | | Config 3, 6 |  | TDDConf.2.1 |  |
| CORESET Reference | | | Config 1, 4 |  | CR.1.1 FDD | A.3.1.2 |
| Channel | | | Config 2, 5 |  | CR.1.1 TDD |  |
|  | | | Config 3, 6 |  | CR.2.1 TDD |  |
| SSB Configuration | | | Config 1, 4 |  | SSB.1 FR1 | A.3.10 |
|  | | | Config 2, 5 |  | SSB.1 FR1 |  |
|  | | | Config 3, 6 |  | SSB.2 FR1 |  |
| SMTC Configuration | | | Config 1, 2, 3, 4, 5, 6 |  | SMTC.1 | A.3.11 |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2, 4, 5 | kHz | 15 |  |
|  | | | Config 3, 6 |  | 30 |  |
| PRACH Configuration | | | Config 1, 2, 4, 5 |  | Table A.3.8.2.2-1 |  |
| Config 3, 6 |  | Table A.3.8.2.2-1 |  |
| csi-RS-Index assigned as beam failure detection RS in set q0 in activated SCell | | | |  | 0 |  |
| OCNG parameters | | | |  | OP.1 | A.3.2.1 |
| CP length | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |  |
| Beam failure detection | | | DCI format |  | 1-0 |  |
| transmission parameters | | | Number of Control OFDM symbols |  | 2 |  |
|  | | | Aggregation level | CCE | 8 |  |
|  | | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
|  | | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
|  | | | DMRS precoder granularity |  | REG bundle size |  |
|  | | | REG bundle size |  | 6 |  |
| DRX | | | |  | DRX.7 | A.3.3.7 |
| Gap pattern ID | | | |  | N.A. |  |
| schedulingRequestID-BFR-SCell-r16 | | | |  | absent | When the field is absent, the random access procedure will be triggered for SCell BFR |
| SSB Index assigned as CBD RS (q1) in activated SCell | | | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdBFR | Config 1, 2, 4, 5 | | | dBm/SCS | -98 | Threshold used |
|  | Config 3, 6 | | |  | -95 | for Qin\_LR\_SSB |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for q0 in activated SCell | | Config 1, 4 | |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.2 TDD |  |
| CSI-RS configuration for CSI reporting | | Config 1, 4 | |  | CSI-RS.1.1 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.1 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | Config 1, 4 | |  | TRS.1.1 FDD |  |
|  | | Config 2, 5 | |  | TRS.1.1 TDD |  |
|  | | Config 3, 6 | |  | TRS.1.2 TDD |  |
| csi-RS-Index assigned as RLM RS in PSCell | | Config 1, 4 | |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | | ms | 1000 |  |
| N310 | | | |  | 2 |  |
| T1 | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 8.37 |  |
| T3 | | | | s | 6.44 |  |
| T4 | | | | s | 0 |  |
| T5 | | | | s | 1.97 |  |
| D1 | | | | s | 1.93 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | |

Table A.4.5.5.6.1-3: Cell specific test parameters for FR1 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | Test 1 Cell3 | | | | |
|  | |  | T1 to T5 | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1, 4 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
|  | Config 2, 5 |  | 5 | 5 | -3 | -12 | -12 | -12 |
|  | Config 3, 6 |  | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1, 4 | dB | -10 | -10 | -10 | 10 | 10 | 10 |
|  | Config 2, 5 |  | -10 | -10 | -10 | 10 | 10 | 10 |
|  | Config 3, 6 |  | -10 | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1, 4 | dBm/SCS kHz | -108 | -108 | -108 | -88 | -88 | -88 |
|  | Config 2, 5 |  | -108 | -108 | -108 | -88 | -88 | -88 |
|  | Config 3, 6 |  | -105 | -105 | -105 | -85 | -85 | -85 |
|  | Config 1, 4 | dBm/ 15 kHz | -98 | -98 | | | | |
|  | Config 2, 5 |  | -98 | -98 | | | | |
|  | Config 3, 6 |  | -98 | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6. | | | | | | | | |

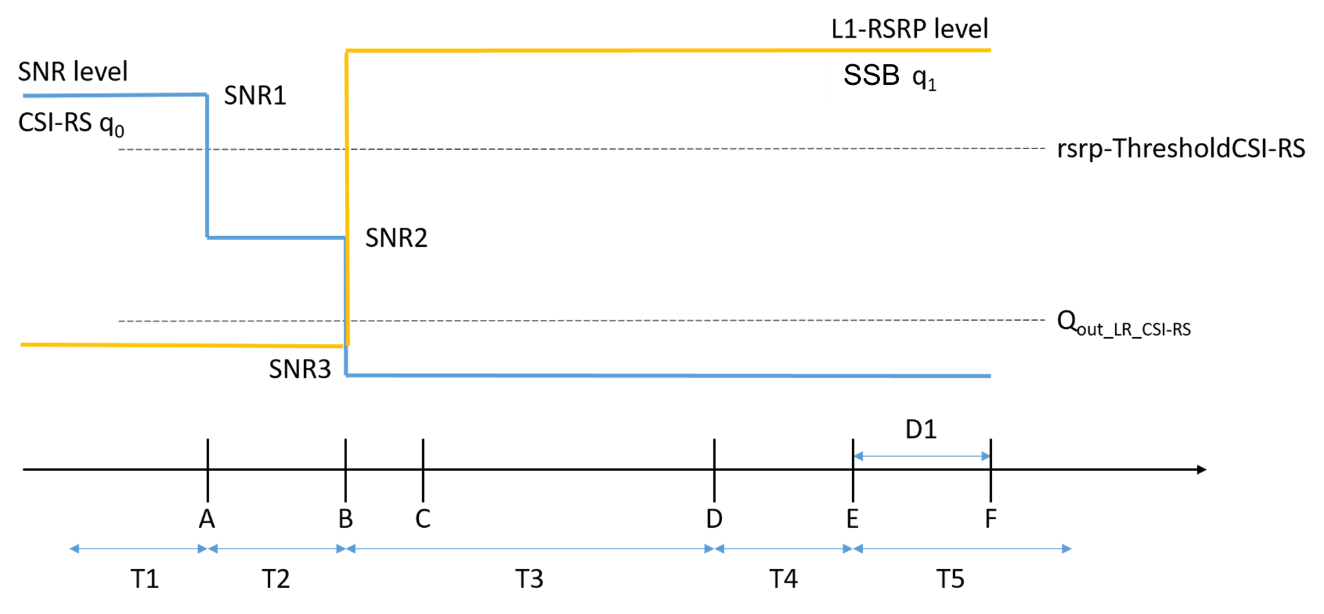


Figure A.4.5.5.6.1-1: SNR and L1-RSRP variation for beam failure detection and LR testing for SCell in DRX mode

##### A.4.5.5.6.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 2.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble for UL-SCH resource application, followed by MAC-CE on the assigned uplink resources containing  a beam associated with the candidate beam set q1. The UE shall not transmit preamble earlier than time point B.

During T5, the System Simulator shall transmit a Random Access Response to UE after the System Simulator receives the preamble from UE. The UE shall transmit the msg.3 containing candidate beam set q1 for SCell BFR if UE receives the Random Access Response.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

**< End of change 7>**

**< Start of change 8 (from - R4-2208342) >**

A.4.5.7.1 Addition and Release Delay of known NR PSCell

A.4.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 [15] for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.4.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.4.5.7.1.1-2 and cell-specific parameters in A.4.5.7.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event B1 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event B1. After receiving the Event B1, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T5.

**Table A.4.5.7.1.1-1: Supported test configurations for FR1 PSCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD |
| 2 | LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD |
| 3 | LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD |
| 4 | LTE TDD, NR SCS 15 kHz, BW 10 MHz, FDD |
| 5 | LTE TDD, NR SCS 15 kHz, BW 10 MHz, TDD |
| 6 | LTE TDD, NR SCS 30 kHz, BW 40 MHz, TDD |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

**Table A.4.5.7.1.1-2: General Test Parameters for PSCell Addition and Release**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
|  | Neighbour cell |  | Cell2 | Neighbour cell on RF channel number 2. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour Cell |  | Cell2 | PSCell released on RF channel number 2. |
| B1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event B1. |
|  | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event B1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
|  | Time to Trigger | S | 0 |  |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration on cell2 | |  | FR1 PRACH configuration 1 | Captured in A.3.8.2.1 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 1 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | 1.5 | During this time the UE shall identify neighbour cell (cell2) and report event B1. |
| T3 | | s | 0.5 | During this time the UE adds the PSCell. |
| T4 | | s | 0.5 | During this time the UE sends CSI reports for PSCell. |
| T5 | | s | 0.5 | During this time the UE releases the PSCell. |

**Table A.4.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test** | | | | |
|  |  |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| E-UTRA RF Channel Number |  | 1,2,3,4,5,6 | 1 | | | | |
| NR RF Channel Number |  | 1,2,3,4,5,6 | 2 | | | | |
| TDD |  | 1,4 | Not Applicable | | | | |
| configuration |  | 2,5 | TDDConf.1.1 | | | | |
|  |  | 3,6 | TDDConf.2.1 | | | | |
| BWchannel | MHz | 1,4 | 10: NRB,c = 52 | | | | |
|  |  | 2,5 | 10: NRB,c = 52 | | | | |
|  |  | 3,6 | 40: NRB,c = 106 | | | | |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 | | | | |
| PDSCH Reference |  | 1,4 | SR.1.1 FDD | | | | |
| measurement |  | 2,5 | SR.1.1 TDD | | | | |
| channel |  | 3,6 | SR.2.1 TDD | | | | |
| RMSI CORESET Reference |  | 1,4 | CR.1.1 FDD | | | | |
| Channel |  | 2,5 | CR.1.1 TDD | | | | |
|  |  | 3,6 | CR.2.1 TDD | | | | |
| Dedicated CORESET Reference |  | 1,4 | CCR.1.1 FDD | | | | |
| Channel |  | 2,5 | CCR.1.1 TDD | | | | |
|  |  | 3,6 | CCR.2.1 TDD | | | | |
| OCNG Patterns |  | 1,2,3,4,5,6 | OP.1 | | | | |
| SSB configuration |  | 1,2,4,5 | SSB.1 FR1 | | | | |
|  |  | 3,6 | SSB.2 FR1 | | | | |
| SMTC configuration |  | 1,2,4,5 | SMTC.1 | | | | |
|  |  | 3,6 | SMTC.1 | | | | |
| TRS Configuration |  | 1,4 | TRS.1.1 FDD | | | | |
|  |  | 2,5 | TRS.1.1 TDD | | | | |
|  |  | 3,6 | TRS.1.2 TDD | | | | |
| CSI-RS configuration for CSI reporting |  | 1,4 | CSI-RS.1.1 FDD | | | | |
| 2,5 | CSI-RS.1.1 TDD | | | | |
| 3,6 | CSI-RS.2.1 TDD | | | | |
| reportConfigType |  | 1,2,3,4,5,6 | periodic | | | | |
| reportQuantity |  | 1,2,3,4,5,6 | cri-RI-PMI-CQI | | | | |
| CSI reporting periodicity | slot | 1,2,4,5 | 5 | | | | |
| 3,6 | 10 | | | | |
| CSI reporting offset | slot | 1,2,4,5 | 2 | | | | |
| 3,6 | 4 | | | | |
| EPRE ratio of PSS to SSS |  |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | | | | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | dB | 1,2,3,4,5,6 | 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/15 kHz | 1,2,3,4,5,6 | N/A | -85 | | | |
| Note2 | dBm/SCS | 1,2,4,5 | N/A | -85 | | | |
|  |  | 3,6 | N/A | -82 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
| SS-RSRPNote3 | dBm/SCS | 1,2,4,5 | -infinity | -85 | | | |
|  |  | 3,6 | -infinity | -82 | | | |
| IoNote3 | dBm/9.36MHz | 1,2,4,5 | N/A | -57 | | | |
|  | dBm/38.1MHz | 3,6 | N/A | -51 | | | |
| Propagation condition |  | 1,2,3,4,5,6 | 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

A.4.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell no later than 82 msNote1 from the start of T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell no later than 20ms from the start of T5.

All the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 [15]:

Tconfig\_PSCell = TRRC\_delay + Tprocessing + Tsearch + T∆ + TPSCell\_ DU + 2ms

Where:

TRRC\_delay = 20ms

Tprocessing = 20ms

Tsearch = 0

T∆ = 20ms

TPSCell\_ DU = 1\*10+10 = 20ms

**< End of change 8>**

**< Start of change 9 (from - R4-2210980) >**

### A.4.5.8 DL Interruptions at switching between two uplink carriers

#### A.4.5.8.1 Test Purpose and Environment

The purpose of this test is to verify DL interruption requirements during UE dynamic switching between two uplink carriers defined in clause 8.2.1.2.14. The test case is applicable for an uplink band pair of an inter-band EN-DC configuration when the capability *uplinkTxSwitchingPeriod* is present.

There are two cells: E-UTRAN FDD PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters for PSCell are given in Table A. 4.5.8.1-1, Table A. 4.5.8.1-2 and Table A. 4.5.8.1-3 below.

Aperiodic CSI-RS for L1-RSRP reporting is triggered with power boosting 6dB on the following symbol on the special slot on NR TDD carrier (Cell 2):

* symbol#10 if UE does not report *uplinkTxSwitching-DL-Interruption-r16;*
* otherwise,
  + symbol#5 if UE capability *uplinkTxSwitchingPeriod* is 140us or
  + symbol #8 if UE capability *uplinkTxSwitchingPeriod* is 35us.

The test parameters and applicability for E-UTRAN FDD PCell are defined in A.3.7.2. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, *uplinkTxSwitching* is indicated to UE. This test verifies that the UE correctly report the L1-RSRP reporting.

Table A. 4.5.8.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | PSCell (Cell2) |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A. 4.5.8.1-2: General test parameters for DL Interruptions at switching between two uplink carriers in EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| RF Channel Number |  | Config 1 | 1, 2 | Two radio channels are used for the test. |
| Active cell |  | Config 1 | Cell 1: E-UTRAN FDD PCell  Cell 2: FR1 PSCell | E-UTRAN FDD PCell on RF channel number 1  FR1 PSCell on RF channel number 2 |
| CP length |  | Config 1 | Normal |  |
| DRX |  | Config 1 | OFF |  |
| Measurement gap pattern Id |  | Config 1 | OFF |  |
| Filter coefficient |  | Config 1 | 0 | L3 filtering is not used |
| CSI-RS configuration for L1-RSRP reporting |  | Config 1 | CSI-RS.2.5 TDD |  |
| T1 | s | Config 1 | 5 |  |

Table A. 4.5.8.1-3: NR Cell specific test parameters for DL Interruptions at switching between two uplink carriers in EN-DC (Cell 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell2 |
| Frequency Range | |  | FR1 |
| Duplex mode | Config 1 |  | TDD |
| TDD configuration | Config 1 |  | TDDConf.2.1 except that:  S=’11DL: 1GP:2UL’;  *nrofDownlinkSymbols: 11*  *nrofUplinkSymbols: 2* |
| BWchannel | Config 1 |  | 40 MHz: NRB,c = 106 |
| Initial BWP Configuration | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 |
| UL dedicated BWP configuration |  |  | ULBWP.1.1 |
| SRS configuration |  |  | SRSConf.4 in Table A.4.5.8.1-4 |
| PDSCH Reference measurement channel | Config 1 |  | SR.2.1 TDD |
| RMSI CORESET parameters | Confiq 1 |  | CR.2.1 TDD |
| Dedicated CORESET parameters | Config 1 |  | CCR.2.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SMTC Configuration | |  | SMTC.1 |
| SSB Configuration | Config 1 |  | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 2x2 low |
| EPRE ratio of PSS to SSS | | dB | 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) | |  |  |
| NocNote 2 | | dBm/15 kHz | -104 |
| SS-RSRP Note 3 | | dBm/SSB SCS | -84 |
| CSI-RS RSRP Note6 | | dBm/SCS | -78 |
| Ês/Iot | | dB | 17 |
| Ês/Noc | | dB | 17 |
| NocNote 2 | Config 1 | dBm/SCS | -101 |
| IoNote3 on symbols without CSI-RS | Config 1 | dBm/  38.16MHz | -52.86 |
| IoNote6 on symbols with CSI-RS | Config 1 | dBm/  38.16MHz | -50.5 |
| Time offset to Cell1 Note 5 | | μs | 0 |
| Propagation Condition | |  | 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 Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

Table A.4.5.8.1-4: SRS Configuration for DL Interruptions at switching between two uplink carriers

|  |  |  |  |
| --- | --- | --- | --- |
|  | Field | SRSConf.4 | Comments |
| SRS- | srs-ResourceSetId | 0 |  |
| ResourceSet | srs-ResourceIdList | 0 |  |
|  | resourceType | Periodic |  |
|  | Usage | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 |  |
|  | nrofSRS-Ports | Port2 |  |
|  | transmissionComb | n2 |  |
|  | combOffset-n2 | 0 |  |
|  | cyclicShift-n2 | 0 |  |
|  | resourceMapping  startPosition | 1 |  |
|  | resourceMapping  nrofSymbols | n2 |  |
|  | resourceMapping  repetitionFactor | n1 |  |
|  | freqDomainPosition | 0 |  |
|  | freqDomainShift | 0 |  |
|  | freqHopping  c-SRS | 0 | Matches NRB,c |
|  | freqHopping  b-SRS | 0 |  |
|  | freqHopping  b-hop | 0 |  |
|  | groupOrSequenceHopping | Neither |  |
|  | resourceType | Periodic |  |
|  | periodicityAndOffset-p | sl8, 3 | Offset to align with DRx periodicity |
|  | sequenceId | 0 | Any 10 bit number |

#### A.4.5.8.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.2.1.2.14.

UE shall send L1-RSRP report while meeting the accuracy requirements defined in clause 10.1.19.2.

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

**< End of change 9>**

**< Start of change 10 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.4.6.1.1.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2 | T1 | T2 |
| TDD |  | 1, 4 | N/A | | N/A | |
| configuration |  | 2, 5 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | SR.1.1 TDD | |  | |
|  |  | 3, 6 | SR.2.1 TDD | |  | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | N/A | |
| RMC |  | 2, 5 | CR.1.1 TDD | | N/A | |
| configuration |  | 3, 6 | CR.2.1 TDD | | N/A | |
| Dedicated |  | 1, 4 | CCR.1.1 FDD | | N/A | |
| CORESET RMC |  | 2, 5 | CCR.1.1 TDD | | N/A | |
| configuration |  | 3, 6 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | | OP.1 | |
| TRS |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | TRS.1.1 TDD | | N/A | |
|  |  | 3, 6 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2, 5 | -98 | | | |
|  |  | 3, 6 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  |  | 2, 5 |  | | | |
|  |  | 3, 6 |  | | | |
|  | dB | 1, 4 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
|  | dB | 1, 4 | 4 | 4 | -Infinity | 4 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -94 | -94 | -Infinity | -94 |
|  |  | 2, 5 | -94 | -94 | -Infinity | -94 |
|  |  | 3, 6 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1, 4 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/9.36 MHz | 2, 5 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/38.16 MHz | 3, 6 | -58.50 | -56.16 | -58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 10>**

**< Start of change 11 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.4.6.1.2.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2 | T1 | T2 |
| TDD |  | 1, 4 | N/A | | N/A | |
| configuration |  | 2, 5 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | SR.1.1 TDD | |  | |
|  |  | 3, 6 | SR.2.1 TDD | |  | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | N/A | |
| RMC |  | 2, 5 | CR.1.1 TDD | | N/A | |
| configuration |  | 3, 6 | CR.2.1 TDD | | N/A | |
| Dedicated |  | 1, 4 | CCR.1.1 FDD | | N/A | |
| CORESET RMC |  | 2, 5 | CCR.1.1 TDD | | N/A | |
| configuration |  | 3, 6 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | | OP.1 | |
| TRS |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | TRS.1.1 TDD | | N/A | |
|  |  | 3, 6 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2, 5 | -98 | | | |
|  |  | 3, 6 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  |  | 2, 5 |  | | | |
|  |  | 3, 6 |  | | | |
|  | dB | 1, 4 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
|  | dB | 1, 4 | 4 | 4 | -Infinity | 4 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -94 | -94 | -Infinity | -94 |
|  |  | 2, 5 | -94 | -94 | -Infinity | -94 |
|  |  | 3, 6 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1, 4 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/9.36 MHz | 2, 5 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | -58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 11>**

**< Start of change 12 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.4.6.1.3.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2 | T1 | T2 |
| TDD |  | 1, 4 | N/A | | N/A | |
| configuration |  | 2, 5 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | SR.1.1 TDD | |  | |
|  |  | 3, 6 | SR.2.1 TDD | |  | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | N/A | |
| RMC |  | 2, 5 | CR.1.1 TDD | | N/A | |
| configuration |  | 3, 6 | CR.2.1 TDD | | N/A | |
| Dedicated |  | 1, 4 | CCR.1.2 FDD | | N/A | |
| CORESET RMC |  | 2, 5 | CCR.1.2 TDD | | N/A | |
| configuration |  | 3, 6 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | | OP.1 | |
| TRS |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | TRS.1.1 TDD | | N/A | |
|  |  | 3, 6 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2, 5 | -98 | | | |
|  |  | 3, 6 | -95 | | | |
| Note 2 | dBm/15 kHz | 1, 4 | -98 | | | |
|  |  | 2, 5 |  | | | |
|  |  | 3, 6 |  | | | |
|  | dB | 1, 4 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
|  | dB | 1, 4 | 4 | 4 | -Infinity | 4 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -94 | -94 | -Infinity | -94 |
|  |  | 2, 5 | -94 | -94 | -Infinity | -94 |
|  |  | 3, 6 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1, 4 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/9.36 MHz | 2, 5 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/38.16 MHz | 3, 6 | -58.50 | -56.16 | -58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 12>**

**< Start of change 13 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.4.6.1.4.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD |  | 1, 4 | N/A | | N/A | |
| configuration |  | 2, 5 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC |  | 1, 4 | SR.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | SR.1.1 TDD | |  | |
|  |  | 3, 6 | SR.2.1 TDD | |  | |
| RMSI CORESET |  | 1, 4 | CR.1.1 FDD | | N/A | |
| RMC |  | 2, 5 | CR.1.1 TDD | | N/A | |
| configuration |  | 3, 6 | CR.2.1 TDD | | N/A | |
| Dedicated |  | 1, 4 | CCR.1.2 FDD | | N/A | |
| CORESET RMC |  | 2, 5 | CCR.1.2 TDD | | N/A | |
| configuration |  | 3, 6 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3, 4, 5, 6 | OP.1 | | OP.1 | |
| TRS |  | 1, 4 | TRS.1.1 FDD | | N/A | |
| configuration |  | 2, 5 | TRS.1.1 TDD | | N/A | |
|  |  | 3, 6 | TRS.1.2 TDD | | N/A | |
| Initial BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1, 4 | -98 | | | |
|  |  | 2, 5 | -98 | | | |
|  |  | 3, 6 | -95 | | | |
| Note 2 | dBm/15 KHz | 1, 4 | -98 | | | |
|  |  | 2, 5 |  | | | |
|  |  | 3, 6 |  | | | |
|  | dB | 1, 4 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
|  | dB | 1, 4 | 4 | 4 | -Infinity | 4 |
|  |  | 2, 5 |  |  |  |  |
|  |  | 3, 6 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS KHz | 1, 4 | -94 | -94 | -Infinity | -94 |
|  |  | 2, 5 | -94 | -94 | -Infinity | -94 |
|  |  | 3, 6 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1, 4 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/9.36 MHz | 2, 5 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/38.16 MHz | 3, 6 | -58.50 | -56.16 | -58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 13>**

**< Start of change 14 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.4.6.1.5.1-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | N/A | | N/A | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.1.1 FDD | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 2 | TRS.1.1 FDD | | N/A | |
| Initial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1, 2 | -98 | | | |
| Note 2 | dBm/15 kHz | 1, 2 | -98 | | | |
|  | dB | 1, 2 | 4 | -1.46 | -Infinity | -1.46 |
|  | dB | 1, 2 | 4 | 4 | -Infinity | 4 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 2 | -94 | -94 | -Infinity | -94 |
| Io | dBm/9.36 MHz | 1, 2 | -64.60 | -62.25 | -64.60 | -62.25 |
| Propagation Condition |  | 1, 2 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 14>**

**< Start of change 15 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.4.6.1.6.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | N/A | | N/A | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.1.2 FDD | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| TRS configuration |  | 1, 2 | TRS.1.1 FDD | | N/A | |
| Initial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1, 2 | -98 | | | |
| Note 2 | dBm/15 kHz | 1, 2 | -98 | | | |
|  | dB | 1, 2 | 4 | -1.46 | -Infinity | -1.46 |
|  | dB | 1, 2 | 4 | 4 | -Infinity | 4 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 2 | -94 | -94 | -Infinity | -94 |
| Io | dBm/9.36 MHz | 1, 2 | -64.60 | -62.25 | -64.60 | -62.25 |
| Propagation Condition |  | 1, 2 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 15>**

**< Start of change 16 (from - R4-2210979) >**

#### A.5.5.5.6 EN-DC Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-RS-based BFD and LR in non-DRX mode

##### A.5.5.5.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for an active SCell and that the UE performs correct CSI-RS-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell with *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 SCell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.6.1-1, A.5.5.5.6.1-2 and A.5.5.5.6.1-3. There are three cells, cell 1 is the E-UTRAN PCell, cell 2 is the PSCell, and cell 3 is the SCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.6.1-1 shows the variation of the downlink SNR of the active SCell and the SNR of the CSI-RS in set q0 in the active SCell to emulate CSI-RS based beam failure. Figure A.5.5.5.6.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1, cell 2, and cell 3. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.5.5.5.6.1-1: Supported test configurations for FR2 PSCell and SCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | LTE TDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.5.5.5.6.1-2: General test parameters for FR2 SCell for beam failure detection and link recovery testing in non-DRX mode



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active E-UTRA PCell | | 1-2 |  | Cell 1 |  |
| E-UTRA RF Channel Number | | 1-2 |  | 1 |  |
| Active PCell | | 1-2 |  | Cell 2 |  |
| RF Channel Number for PSCell | | 1-2 |  | 2 |  |
| Active SCell | | 1-2 |  | Cell 3 |  |
| RF Channel Number for SCell | | 1-2 |  | 3 |  |
| Duplex mode | | 1-2 |  | TDD |  |
| TDD Configuration | | 1-2 |  | TDDConf.3.1 |  |
| BWchannel | | 1-2 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1-2 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1-2 | kHz | 120 |  |
| DL initial BWP configuration | | 1-2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1-2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1-2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1-2 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1-2 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1-2 |  | CR.3.1 TDD | A.3.1.2 |
| Dedicated CORESET Reference Channel | | 1-2 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1-2 |  | OP.1 | A.3.2.1 |
| CP length | | 1-2 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1-2 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1-2 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1-2 |  | SSB.3 FR2 | A.3.10 |
| SMTC Configuration | | 1-2 |  | SMTC.3 | A.3.11 |
| PRACH Configuration | | 1-2 |  | FR2 PRACH configuration 4 | Table A.3.8.3.4-1 |
| DRX configuration | | 1-2 |  | OFF |  |
| CSI-RS configuration for BFD/CBD in activated SCell | | 1-2 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) in activated SCell | | 1-2 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) in activated SCell | | 1-2 |  | 1 |  |
| CSI-RS configuration for RLM in PSCell | | 1-2 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| Beam failure detection transmission parameters | DCI format | 1-2 |  | 1-0 |  |
| Number of Control OFDM symbols | 1-2 |  | 2 |  |
| Aggregation level | 1-2 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1-2 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1-2 | dB | 0 |  |
| DMRS precoder granularity | 1-2 |  | REG bundle size |  |
| REG bundle size | 1-2 |  | 6 |  |
| Gap pattern ID | | 1-2 |  | N/A |  |
| schedulingRequestID-BFR-SCell-r16 | | 1-2 |  | Configured |  |
| Periodicity of PUCCH for SR configuration for BFR on SCell | | 1-2 | slot | 40 | 5ms |
| Offset of PUCCH for SR configuration for BFR on SCell | | 1-2 | slot | 4 |  |
| PUCCH parameters for SR configuration for BFR on SCell | | 1-2 |  | Table 8.3.3.1.2-1 in [13] |  |
| rlmInSyncOutOfSyncThreshold | | 1-2 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1-2 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1-2 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1-2 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1-2 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1-2 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1-2 |  | periodic |  |
| reportQuantity | | 1-2 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1-2 | slot | 40 |  |
| CSI reporting offset | | 1-2 | slot | 4 |  |
| T310 | | 1-2 | ms | 1000 |  |
| N310 | | 1-2 |  | 2 |  |
| T1 | | 1-2 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1-2 | s | 1.17 |  |
| T3 | | 1-2 | s | 0.9 |  |
| T4 | | 1-2 | s | 0 |  |
| T5 | | 1-2 | s | 0.31 |  |
| D1 | | 1-2 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.5.5.5.6.1-3: Cell specific test parameters for FR2 SCell for beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | Cell3  Test 1 | | | | |
|  | |  | T1 to T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1,2 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1,2 | dB | 0.2 | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1,2 | dBm/SCS  kHz | -104.5 | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| Noc | Config 1,2 | dBm/120kHz | -104.7 | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |



Figure A.5.5.5.6.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing for SCell in non-DRX mode

##### A.5.5.5.6.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 in A.5.5.5.6.1 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 2.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

During T3 the UE shall detect beam failure and initial link recovery. During T4 and T5 the UE measures and evaluates beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q1. The UE shall not transmit PUCCH with an LRR with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.5.5.5.7 EN-DC Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-RS-based BFD and LR in DRX mode

##### A.5.5.5.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for an active SCell and that the UE performs correct CSI-RS-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell with *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 SCell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.7.1-1, A.5.5.5.7.1-2 and A.5.5.5.7.1-3. There are three cells, cell 1 is the E-UTRAN PCell, cell 2 is the PSCell, and cell 3 is the SCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.7.1-1 shows the variation of the downlink SNR of the active SCell and the SNR of the CSI-RS in set q0 in the active SCell to emulate CSI-RS based beam failure. Figure A.5.5.5.7.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1, cell 2, and cell 3. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.5.5.5.7.1-1: Supported test configurations for FR2 PSCell and SCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | LTE TDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |

Table A.5.5.5.7.1-2: General test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active E-UTRA PCell | | 1-2 |  | Cell 1 |  |
| E-UTRA RF Channel Number | | 1-2 |  | 1 |  |
| Active PCell | | 1-2 |  | Cell 2 |  |
| RF Channel Number for PSCell | | 1-2 |  | 2 |  |
| Active SCell | | 1-2 |  | Cell 3 |  |
| RF Channel Number for SCell | | 1-2 |  | 3 |  |
| Duplex mode | | 1-2 |  | TDD |  |
| TDD Configuration | | 1-2 |  | TDDConf.3.1 |  |
| BWchannel | | 1-2 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1-2 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1-2 | kHz | 120 |  |
| DL initial BWP configuration | | 1-2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1-2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1-2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1-2 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1-2 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1-2 |  | CR.3.1 TDD | A.3.1.2 |
| Dedicated CORESET Reference Channel | | 1-2 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1-2 |  | OP.1 | A.3.2.1 |
| CP length | | 1-2 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1-2 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1-2 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1-2 |  | SSB.3 FR2 | A.3.10 |
| SMTC Configuration | | 1-2 |  | SMTC.3 | A.3.11 |
| PRACH Configuration | | 1-2 |  | FR2 PRACH configuration 4 | Table A.3.8.3.4-1 |
| DRX configuration | | 1-2 |  | DRX.3 | A.3.3.3 |
| CSI-RS configuration for BFD/CBD in activated SCell | | 1-2 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) in activated SCell | | 1-2 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) in activated SCell | | 1-2 |  | 1 |  |
| CSI-RS configuration for RLM in PSCell | | 1-2 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| Beam failure detection transmission parameters | DCI format | 1-2 |  | 1-0 |  |
| Number of Control OFDM symbols | 1-2 |  | 2 |  |
| Aggregation level | 1-2 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1-2 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1-2 | dB | 0 |  |
| DMRS precoder granularity | 1-2 |  | REG bundle size |  |
| REG bundle size | 1-2 |  | 6 |  |
| Gap pattern ID | | 1-2 |  | N/A |  |
| schedulingRequestID-BFR-SCell-r16 | | 1-2 |  | Configured |  |
| Periodicity of PUCCH for SR configuration for BFR on SCell | | 1-2 | slot | 40 | 5ms |
| Offset of PUCCH for SR configuration for BFR on SCell | | 1-2 | slot | 4 |  |
| PUCCH parameters for SR configuration for BFR on SCell | | 1-2 |  | Table 8.3.3.1.2-1 in [13] |  |
| rlmInSyncOutOfSyncThreshold | | 1-2 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1-2 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1-2 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1-2 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1-2 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1-2 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1-2 |  | periodic |  |
| reportQuantity | | 1-2 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1-2 | slot | 40 |  |
| CSI reporting offset | | 1-2 | slot | 4 |  |
| T310 | | 1-2 | ms | 1000 |  |
| N310 | | 1-2 |  | 2 |  |
| T1 | | 1-2 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1-2 | s | 5.43 |  |
| T3 | | 1-2 | s | 5.16 |  |
| T4 | | 1-2 | s | 0 |  |
| T5 | | 1-2 | s | 0.31 |  |
| D1 | | 1-2 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.5.5.5.7.1-3: Cell specific test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | Cell3  Test 1 | | | | |
|  | |  |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.155 | Setup 1 defined in A.3.155 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1,2 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1,2 | dB | 0.2 | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1,2 | dBm/  SCS  kHz | -104.5 | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| Noc | Config 1,2 | dBm/120  kHz | -104.7 | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.7.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |



Figure A.5.5.5.7.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing for SCell in DRX mode

##### A.5.5.5.7.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 in A.5.5.5.7.1 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 2.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

During T3 the UE shall detect beam failure and initial link recovery. During T4 and T5 the UE measures and evaluates beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q1. The UE shall not transmit PUCCH with an LRR with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

**< End of change 16>**

**< Start of change 17 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.5.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1~4 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1~4 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1,2 | 24 | | 24 | |
|  |  | 3,4 | 48 | | 48 | |
| Intial BWP configuration |  | 1~4 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1~4 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1~4 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1~4 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1,2 | SR.3.2 TDD | | N/A | |
|  |  | 3,4 | SR.3.3 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1,2 | CR.3.1 TDD | | N/A | |
|  |  | 3,4 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1,2 | CCR.3.1 TDD | | N/A | |
|  |  | 3,4 | CCR.3.7 TDD | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1~4 | 120 | | 120 | |
| OCNG Patterns |  | 1~4 | OP.5 | | N/A | |
| TRS configuration |  | 1~4 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state |  | 1~4 | TCI.State.2 | | N/A | |
| cellIndividualOffset | dB | 1~4 | N/A | | 16 | |
| SSB configuration |  | 1, 2 | SSB.3 FR2 | | SSB.7 FR2 | |
|  |  | 3, 4 | SSB.4 FR2 | | SSB.8 FR2 | |
| Propagation Condition |  | 1~4 | AWGN | | AWGN | |

**< End of change 17>**

**< Start of change 18 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.5.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1~4 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1~4 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1~4 | 66 | | 66 | |
| Intial BWP configuration |  | 1~4 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1~4 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1~4 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1~4 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1,2 | SR.3.2 TDD | | N/A | |
|  |  | 3,4 | SR.3.3 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1,2 | CR.3.1 TDD | | N/A | |
|  |  | 3,4 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1,2 | CCR.3.1 TDD | | N/A | |
|  |  | 3,4 | CCR.3.7 TDD | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1~4 | 120 | | 120 | |
| OCNG Patterns |  | 1~4 | OP.1 | | OP.1 | |
| PDSCH/PDCCH TCI state |  | 1~4 | TCI.State.2 | | N/A | |
| CSI-RS for tracking |  |  | TRS.2.1 TDD | | N/A | |
|  | TRS.2.1 TDD | | N/A | |
| SSB configuration |  | 1, 2 | SSB.3 FR2 | | SSB.3 FR2 | |
|  |  | 3, 4 | SSB.4 FR2 | | SSB.4 FR2 | |
| Propagation Condition |  | 1~4 | AWGN | | AWGN | |

**< End of change 18>**

**< Start of change 19 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.5.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1~4 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1~4 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1,2 | 24 | | 24 | |
|  |  | 3,4 | 48 | | 48 | |
| Intial BWP configuration |  | 1~4 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1~4 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1~4 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1~4 | CSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1,2 | SR.3.2 TDD | | N/A | |
|  |  | 3,4 | SR.3.3 TDD | |  | |
| RMSI CORESET RMC configuration | 1,2 | CR.3.1 TDD | CR.3.1 TDD | | N/A | |
|  | 3,4 | CR.3.2 TDD | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration | 1,2 | CCR.3.1 TDD | CCR.3.1 TDD | | N/A | |
|  | 3,4 | CCR.3.7 TDD | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1~4 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state |  | 1~4 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1~4 | 120 | | 120 | |
| OCNG Patterns |  | 1~4 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1~4 | N/A | | 16 | |
| SSB |  | 1, 2 | SSB.3 FR2 | | SSB.7 FR2 | |
|  |  | 3, 4 | SSB.4 FR2 | | SSB.8 FR2 | |
| Propagation Condition |  | 1~4 | AWGN | | AWGN | |

**< End of change 19>**

**< Start of change 20 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.5.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1~4 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1~4 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1~4 | 66 | | 66 | |
| Intial BWP configuration |  | 1~4 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1~4 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1~4 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1~4 | CSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1,2 | SR.3.2 TDD | | N/A | |
|  |  | 3,4 | SR.3.3 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1,2 | CR.3.1 TDD | | N/A | |
|  |  | 3,4 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1,2 | CCR.3.1 TDD | | N/A | |
|  |  | 3,4 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1~4 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state |  | 1~4 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1~4 | 120 | | 120 | |
| OCNG Patterns |  | 1~4 | OP.1 | | OP.1 | |
| SSB |  | 1, 2 | SSB.3 FR2 | | SSB.3 FR2 | |
|  |  | 3, 4 | SSB.4 FR2 | | SSB.4 FR2 | |
| Propagation Condition |  | 1~4 | AWGN | | AWGN | |

**< End of change 20>**

**< Start of change 21 (from R4-2210981) >**

A.5.6.6.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR configured when DRX is used

A.5.6.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.1, with the testing configurations for NR cells in Table A.5.6.6.1.1-1.

**Table A.5.6.6.1.1-1: Applicable NR configurations for FR2 CSI-RS based L1-SINR test**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

A.5.6.6.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.6.1.2-1 and Table A.5.6.6.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1- SINR on aperiodic CSI-RS resources. After 480ms from the beginning of the test, the DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.6.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

**Table A.5.6.6.1.2-1: General test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Value** |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD |
| SSB configuration | 1~2 |  | SSB.1 FR2 |
| CSI-RS configuration | 1~2 |  | CSI-RS.3.3 TDD |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| DRX configuration | 1~2 |  | DRX.3 |
| reportConfigType | 1~2 |  | aperiodic |
| reportQuantity-r16 | 1~2 |  | cri-SINR-r16 |
| Number of reported RS | 1~2 |  | 2 |
| qcl-Info | 1~2 |  | SSB#0 for resource#0 |
| SSB#1 for resource#1 |
| reportSlotOffsetList | 1~2 |  | 26 |
| Propagation condition | 1~2 |  | AWGN |
| T1 | 1~2 | s | 5 |
| EPRE ratio of PSS to SSS | 1~2 | dB | 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 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.5.6.6.1.2-1: CSI-RS specific test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **CSI-RS#0** | **CSI-RS#1** |
| Angle of arrival configuration | 1~2 |  | Setup 1 according to A.3.15.1 | |
| Beam assumptionNote 3 | 1~2 |  | Rough | |
| Note1 | 1~2 | dBm/15kHz | -105 | |
| Note1 | 1~2 | dBm/SSB SCS | -95.97 | |
|  | 1~2 | dB | 0 | 9 |
| CSI-RS RSRP Note2 | 1~2 | dBm/SSB SCS | -95.97 | -86.97 |
| Io Note2 | 1~2 | dBm/95.04MHz | -63.97 | -57.47 |
|  | 1~2 | dB | 0 | 9 |
| Note 1: 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: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.5.6.6.1.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-SINR report at slot 26 from the reception of DCI triggering the L1-SINR measurement. The L1-SINR report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.28.1.

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

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

A.5.6.6.2 L1-SINR measurement with SSB based CMR and dedicated IMR when DRX is not used

A.5.6.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.2, with the testing configurations for NR cells in Table A.5.6.6.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

**Table A.5.6.6.2.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with SSB based CMR and CSI-RS based IMR**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

A.5.6.6.2.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.6.2.2-1 and Table A.5.6.6.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the SSBs and the associated CSI-RS resources, and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD measurements based on the SSBs, and UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-RS resources as IMR.

**Table A.5.6.6.2.2-1: General test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Value** |
| SSB GSCN | 1~4 |  | freq1 |
| Duplex mode | 1~4 |  | TDD |
| TDD Configuration | 1~4 |  | TDDConf.3.1 |
| BWchannel | 1~4 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1~4 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~4 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~4 |  | CCR.3.1 TDD |
| SSB configuration | 1,2 |  | SSB.1 FR2 |
| 3,4 | SSB.2 FR2 |
| CSI-RS configuration | 1~4 |  | CSI-RS.3.1A TDD |
| OCNG Patterns | 1~4 |  | OP.1 |
| Initial BWP Configuration | 1~4 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~4 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1~4 |  | SMTC.1 |
| TRS Configuration | 1~4 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~4 |  | TCI.State.2 |
| DRX configuration | 1~4 |  | off |
| reportConfigType | 1~4 |  | periodic |
| reportQuantity-r16 | 1~4 |  | ssb-Index-SINR-r16 |
| Number of reported RS | 1~4 |  | 2 |
| L1-SINR reporting period | 1~4 | slot | 640 |
| T1 | 1~4 | s | 5 |
| T2 | 1~4 | s | 3 |
| EPRE ratio of PSS to SSS | 1~4 | dB | 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 condition | 1~4 |  | 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. | | | |

**Table A.5.6.6.2.2-2: SSB specific test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **SSB#0** | | **SSB#1** | |
| **T1** | **T2** | **T1** | **T2** |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | | | |
| Beam assumptionNote 4 |  |  | Rough | | | |
| Note2 | 1~4 | dBm/15kHz | -105 | | | |
| Note2 | 1,2 | dBm/SSB SCS | -96 | | | |
| 3,4 | -93 | | | |
|  | 1~4 | dB | 0 | 0 | -Infinity | 9 |
| SSB RSRP Note3 | 1,2 | dBm/SSB SCS | -96 | -96 | -Infinity | -87 |
| 3,4 | -93 | -93 | -Infinity | -84 |
| Io Note3 | 1,2 | dBm/95.04MHz | -63.97 | -63.97 | -67 | -57.5 |
| 3,4 | -63.97 | -63.97 | -67 | -57.5 |
|  | 1~4 | dB | 0 | 0 | -Infinity | 9 |
| 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: SSB RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: 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.5.6.6.2.2-3: CSI-RS specific test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **CSI-RS#0** | | **CSI-RS#1** | |
| **T1** | **T2** | **T1** | **T2** |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | | | |
| Beam assumptionNote 4 |  |  | Rough | | | |
| Note2 | 1~4 | dBm/15kHz | -105 | | | |
| Note2 | 1~4 | dBm/CSI-RS SCS | -96 | | | |
|  | 1~4 | dB | 0 | 0 | -Infinity | 9 |
|  | 1~4 | dB | 0 | 0 | -Infinity | 9 |
| CSI-RS RSRP Note3 | 1~4 | dBm/ CSI-RS SCS | -96 | -96 | -Infinity | -87 |
| Io Note3 | 1~4 | dBm/95.04MHz | -63.97 | -63.97 | -67 | -57.5 |
| 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: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

A.5.6.6.2.3 Test Requirements

The UE shall send L1-SINR report every 640 slots. No later than X ms plus 640 slots from the beginning of time period T2, UE shall send L1-SINR report including the results for both SSB#0+CSI-RS#0 and SSB#1+CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.28.2, where X is

- 2880 for UE supporting power class 1

- 1920 for UE supporting power class 2, 3 or 4.

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

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

**< End of change 21>**

**< Start of change 22 (from R4-2210981) >**

A.5.7.6.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR configured and CSI-RS resource set with repetition off

A.5.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.8.4.1 and clause 10.1.28.1 for FR2 L1-SINR measurements based on CSI-RS with the testing configurations for NR cells in Table A.5.7.6.1.1-1, which configures the measurement resources for the CSI-RS based CMR and no dedicated IMR.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

**Table A.5.7.6.1.1-1: Applicable NR configurations for FR2 L1-SINR test with CSI-RS based CMR and no dedicated IMR configured**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

A.5.7.6.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.6.1.2-1 and Table A.5.7.6.1.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.5.7.6.1.2-1 and Table A.5.7.6.1.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

**Table A.5.7.6.1.2-1: FR2 CSI-RS based L1-SINR general test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD |
| SSB configuration | 1~2 |  | SSB.1 FR2 |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.1  ULBWP.1.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| CSI-RS | 1~2 |  | CSI-RS.3.2 TDD |
| reportConfigType | 1~2 |  | periodic |
| reportQuantity-r16 | 1~2 |  | cri-SINR-r16 |
| nrofReportedRS | 1~2 |  | 2 |
| L1-RSRP reporting period | 1~2 |  | slot640 |
| Propagation condition | 1~2 |  | AWGN |
| Antenna configuration | 1~2 |  | 1x2 |
| EPRE ratio of PSS to SSS | 1~2 | dB | 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 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. | | | |

**Table A.5.7.6.1.2-1-2: FR2 CSI-RS based L1-SINR OTA related test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | |
| **CSI-RS0** | **CSI-RS1** |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | |
|  | 1~2 | dBm/15kHz | -100 | |
|  | 1~2 | dBm/SSB SCS | -91 | |
|  | 1~2 | dB | 10 | -2 |
| CSI-RS-RSRPNote1 | 1~2 | dBm/SCS | -81 | -93 |
| IoNote1 | 1~2 | dBm/  95.04MHz | -51.57 | -59.86 |
|  | 1~2 | dB | 10 | -2 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: Void.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.5.7.6.1.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 2 shall fulfil the requirements in clauses 10.1.28.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.5.7.6.1.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.1.2-1.

**Table A.5.7.6.1.3-1: L1-SINR absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | Test requirement Notes1,2 |
| CSI-RS0 | L1-SINR0-δ≤ Reported SINR(dB) ≤L1-SINR0+δ |
| CSI-RS1 | L1-SINR1-δ ≤ Reported SINR(dB) ≤L1-SINR1+δ |
| Note 1: L1-SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration  Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.1.1-1, selected according to the Io used in the test | |

A.5.7.6.2 L1-SINR measurement with SSB based CMR and dedicated IMR

A.5.7.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.8.4.2 and clause 10.1.28.2 for L1-SINR measurements with SSB based CMR and dedicated CSI-RS based IMR, with the testing configurations for NR cells in Table A.5.7.6.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

**Table A.5.7.6.2.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with SSB based CMR and CSI-RS based IMR**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

A.5.7.6.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.6.2.2-1 and Table A.5.7.6.2.2-2 below. The absolute accuracy of L1-SINR measurements are tested by using the parameters in Table A.5.7.6.2.2-1 and Table A.5.7.6.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources and one CSI-RS resource set with two CSI-RS resource. UE is configured to perform RLM and BFD measurement based on the SSB resources 0 and 1. UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-RS resources as IMR.

**Table A.5.7.6.2.2-1: FR2 L1-SINR measurement test parameters with SSB based CMR and CSI-IM based IMR**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** |
| SSB GSCN | 1~4 |  | freq1 |
| Duplex mode | 1~4 |  | TDD |
| TDD Configuration | 1~4 |  | TDDConf.3.1 |
| BWchannel | 1~4 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1~4 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~4 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~4 |  | CCR.3.1 TDD |
| SSB configuration | 1,2 |  | SSB.1 FR2 |
| 3,4 | SSB.2 FR2 |
| CSI-RS configuration | 1~4 |  | CSI-RS 3.1A TDD |
| OCNG Patterns | 1~4 |  | OP.1 |
| Initial BWP Configuration | 1~4 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~4 |  | DLBWP.1.3  ULBWP.1.3 |
| TRS Configuration | 1~4 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~4 |  | TCI.State.2 |
| SMTC configuration | 1~4 |  | SMTC.1 |
| reportConfigType | 1~4 |  | periodic |
| reportQuantity-r16 | 1~4 |  | ssb-Index-SINR-r16 |
| Number of reported RS | 1~4 |  | 2 |
| L1-SINR reporting period | 1~4 |  | slot640 |
| Propagation condition | 1~4 |  | AWGN |
| Antenna configuration | 1~4 |  | 1x2 |
| EPRE ratio of PSS to SSS | 1~4 | dB | 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 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. | | | |

**Table A.5.7.6.2.2-2: FR2 SSB specific test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | |
| **SSB#0** | **SSB#1** |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | |
|  | 1~4 | dBm/15kHz | -100 | |
|  | 1,2 | dBm/SSB SCS | -91 | |
| 3,4 | -88 | |
|  | 1~4 | dB | 10 | 0 |
| SSB RSRPNote1 | 1,2 | dBm/SCS | -81 | -91 |
| 3,4 | -78 | -88 |
| IoNote1 | 1~4 | dBm/  95.04MHz | -51.57 | |
|  | 1~4 | dB | 10 | 0 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: 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.5.7.6.2.2-3: FR2 CSI-RS specific test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | |
| **CSI-RS#0** | **CSI-RS#1** |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | |
|  | 1~4 | dBm/15kHz | -100 | |
|  | 1~4 | dBm/CSI-RS SCS | -91 | |
|  | 1~4 | dB | 10 | 0 |
| CSI-RS RSRPNote1 | 1~4 | dBm/SCS | -81 | -91 |
| IoNote1 | 1~4 | dBm/  95.04MHz | -51.57 | -59.86 |
|  | 1~4 | dB | 10 | 0 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.5.7.6.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for SSB#0+CSI-RS#0 and SSB#1+CSI-RS#1 of Cell 2 shall fulfil the requirements in clauses 10.1.28.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB#0+CSI-RS#0 and absolute accuracy of SSB#1+CSI-RS#1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.5.7.6.2.3-1.

Relative accuracy of SSB#0+CSI-RS#0 compared with SSB#1+CSI-RS#1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.2.2-1.

**Table A.5.7.6.2.3-1: L1-SINR absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | Test requirement Notes1,2 |
| SSB#0+CSI-RS#0 | L1\_SINR0 -δ + ≤ Reported SINR (dB) ≤ L1\_SINR 0 +δ |
| SSB#1+CSI-RS#1 | L1\_SINR1 -δ + ≤ Reported SINR (dB) ≤ L1\_SINR1 +δ |
| Note 1: L1\_SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB#n+CSI-RS#n under consideration  Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.2.1-1, selected according to the Io used in the test | |

A.5.7.6.3 L1-SINR measurement with CSI-RS based CMR and dedicated IMR

A.5.7.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will partly verify the requirements in Clauses 9.8.4.3 and clause 10.1.28.3 for L1-SINR measurements based on CSI-RS as CMR and CSI-IM as IMR with the testing configurations for NR cells in Table A.5.7.6.3.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

**Table A.5.7.6.3.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with CSI-RS based CMR and CSI-IM based IMR**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

A.5.7.6.3.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.6.3.2-1 and A.5.7.6.3.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.5.7.6.3.2-1 and A.5.7.6.3.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources and one CSI-IM resource set with two CSI-IM resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB. UE is configured to perform L1-SINR measurement based on the configured CSI-RS as CMR and CSI-IM as IMR.

**Table A.5.7.6.3.2-1: FR2 L1-SINR measurement test with CSI-RS based CMR and CSI-IM based IMR**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD |
| SSB configuration | 1~2 |  | SSB.1 FR2 |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.1  ULBWP.1.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| CSI-RS configuration as CMR | 1~2 |  | CSI-RS.3.2 TDD |
| CSI-IM configuration as IMR | 1~2 |  | CSI-IM.3.3 TDD |
| reportConfigType | 1~2 |  | periodic |
| reportQuantity-r16 | 1~2 |  | cri-SINR-r16 |
| nrofReportedRS | 1~2 |  | 2 |
| L1-RSRP reporting period | 1~2 |  | slot640 |
| Propagation condition | 1~2 |  | AWGN |
| Antenna configutaion | 1~2 |  | 1x2 |
| EPRE ratio of PSS to SSS | 1~2 | dB | 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 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. | | | |

**Table A.5.7.6.3.2-2: FR2 CSI-RS based L1-SINR measurement OTA related test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | |
| **CSI-RS0** | **CSI-RS1** |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | |
|  | 1~2 | dBm/15kHz | -100 | |
|  | 1~2 | dBm/SSB SCS | -91 | |
|  | 1~2 | dB | 10 | -2 |
| CSI-RS-RSRPNote1 | 1~2 | dBm/SCS | -81 | -93 |
| IoNote1 | 1~2 | dBm/  95.04MHz | -51.57 | -59.86 |
|  | 1~2 | dB | 10 | -2 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: No additional noise is added by the test system in Test 2.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.5.7.6.3.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for CSI-RS#0+CSI-IM#0 and CSI-RS#1+CSI-IM#1 of Cell 2 shall fulfil the requirements in clauses 10.1.28.3. The following requirements are to be verified:

Absolute accuracy of CSI-RS#0 and absolute accuracy of CSI-RS#1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.5.7.6.3.3-1.

Relative accuracy of CSI-RS#0 compared with CSI-RS#1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.3.2-2.

**Table A.5.7.6.3.3-1: L1-SINR absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | Test requirement Notes1,2 |
| CSI-RS#0 | L1-SINR0 -δ≤ Reported SINR(dBm) ≤L1-SINR 0 +δ |
| CSI-RS#1 | L1-SINR 1 -δ≤ Reported SINR(dBm) ≤L1-SINR 1 +δ |
| Note 1: L1-SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS#n under consideration  Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.3.1-2. | |

**< End of change 22>**

**< Start of change 23 (from R4-2208907, R4-2209078) >**

A.6.1.2.2 Cell reselection to lower priority E-UTRAN

A.6.1.2.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of lower priority.

A.6.1.2.2.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.2.2-1, A.6.1.2.2.2-2, A.6.1.2.2.2-3 and A.6.1.2.2.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

**Table A.6.1.2.2.2-1: Supported test configurations**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Description of serving cell** | **Description of target cell** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| 6 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

**Table A.6.1.2.2.2-2: General test parameters for NR to E-UTRAN cell re-selection test case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell1 | The UE camps on cell 1 in the initial phase. |
|  | Neighbour cell |  | 1, 2, 3, 4, 5, 6 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell2 | The UE shall perform reselection to cell 2 during T1. |
|  | Neighbour cell |  | 1, 2, 3, 4, 5, 6 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell1 | The UE shall perform reselection to cell 1 during T2 for iteration of the tests. |
|  | Neighbour cell |  | 1, 2, 3, 4, 5, 6 | Cell2 |  |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1, 2, 3 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
|  | |  | 4, 5, 6 | 4 |  |
| T1 | | s | 1, 2, 3, 4, 5, 6 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4, 5, 6 | 75 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

**Table A.6.1.2.2.2-3: Cell specific test parameters for NR cell 1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | |
| **T1** | **T2** |
| TDD configuration |  | 1, 4 | N/A | |
|  | 2, 5 | TDDConf.1.1 | |
|  | 3, 6 | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | |
|  | 2, 5 | SR.1.1 TDD | |
|  | 3, 6 | SR.2.1 TDD | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | |
|  | 2, 5 | CR.1.1 TDD | |
|  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | |
|  | 2, 5 | CCR.1.1 TDD | |
|  | 3, 6 | CCR.2.1 TDD | |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | |
|  | 2, 5 | SSB.1 FR1 | |
|  | 3, 6 | SSB.2 FR1 | |
| SMTC configuration |  | 1, 4 | SMTC.2 | |
|  | 2, 5 | SMTC.1 | |
|  | 3, 6 | SMTC.1 | |
| OCNG Pattern |  | 1, 2, 3, 4, 5, 6 | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | |
| 3, 6 | -137 | |
|  | dBm/SCS | 1, 4 | -98 | |
| 2, 5 | -98 | |
| 3, 6 | -95 | |
|  | dBm/15 kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| SS-RSRP | dBm/SCS | 1, 4 | -102 | -86 |
| 2, 5 | -102 | -86 |
| 3, 6 | -99 | -83 |
|  | dB | 1, 4 | -4 | 12 |
| 2, 5 |
| 3, 6 |
|  | dB | 1, 4 | -4 | 12 |
| 2, 5 |
| 3, 6 |
| Io | dBm/9.36 MHz | 1, 4 | -68.60 | -57.78 |
| dBm/9.36 MHz | 2, 5 | -68.60 | -57.78 |
| dBm/38.16 MHz | 3, 6 | -62.50 | -51.69 |
| Treselection | S | 1, 2, 3, 4, 5, 6 | 0 | |
| SnonintrasearchP | dB | 1, 2, 3, 4, 5, 6 | Not sent | |
| Threshx, highP | dB | 1, 2, 3, 4, 5, 6 | 48 | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6 | 44 | |
| Threshx, lowP (Note 2) | dB | 1, 2, 3, 4, 5, 6 | 50 | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | 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: This refers to the value of Thresh**x, Low** which is included in NR system information, and is a threshold for the E-UTRA target cell | | | | |

**Table A.6.1.2.2.2-4: Cell specific test parameters for E-UTRA cell 2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 2** | |
| **T1** | **T2** |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -84 | -84 |
|  | dB | 14 | 14 |
|  | dB | 14 | 14 |
| TreselectionEUTRAN | S | 0 | |
| SnonintrasearchP | dB | Not sent | |
| Threshx, highP (Note 2) | dB | 48 | |
| Threshserving, lowP | dB | 44 | |
| Threshx, lowP | dB | 50 | |
| Propagation Condition |  | 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: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | |

A.6.1.2.2.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

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

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: Tevaluate, E-UTRAN + TSI-E-UTRA,

Where:

Tevaluate, E-UTRAN See Table 4.2.2.5-1 in clause 4.2.2.5

TSI-E-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

**< End of change 23>**

**< Start of change 24 (from R4-2210091) >**

#### A.6.3.1.7 Intra-frequency synchronous DAPS handover in FR1

##### A.6.3.1.7.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency DAPS handover requirements in synchronous scenario specified in clause 6.1.3.2.

##### A.6.3.1.7.2 Test Parameters

Supported test configurations are shown in Table A.6.3.1.7.2-1. Both handover delay and interruption length are tested by using the parameters in Table A.6.3.1.7.2-2, and A.6.3.1.7.2-3.The test consists of five successive time periods, with time durations of T1, T2, T3, T4, and T5 respectively.

Before the start of T1, the UE is connected to the cell1 and not aware of the cell2. The UE shall be configured with periodic CSI reporting for cell1. During T1, the UE does not have any timing information of the cell2.

Starting T2, the cell2 becomes detectable. During T2, the UE performs cell detection and measurements on the cell2 and shall send event report to the network. After receiving the event report A3, the network sends a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing DAPS handover command is sent to the UE. During T3, UE shall be able to perform random access, DL reception or UL transmission in the cell2 while the DL scheduling and UL feedback in the cell1 shall be avoided. After successful RACH procedure of the cell2, UE is scheduled with PDSCH from cell1 and cell2 in alternative TTIs where both cell1 and cell2 belong to the same TAG. In the end the network sends a RRC message implying cell1 release to the UE. During T3, the handover delay Dhandover1 for target cell addition need to be verified.

The start of T4 is the instant when the last TTI containing cell1 release command is sent to the UE. During T4, the UE shall accomplish the release actions within Dhandover2.

Starting T5, the UE stops sending the periodical CSI report to the cell1.

Table A.6.3.1.7.2-1: Intra-frequency DAPS handover in FR1 test configurations

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

Table A.6.3.1.7.2-2: General test parameters synchronous Intra-frequency DAPS handover in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |
| T4 | | ms | Dhandover2 | DHandover2­ is defined in clause 6.1.3.2.1 |
| T5 | | ms | 100 |  |

**Table A.6.3.1.7.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency DAPS handover test case**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 1 | | | | | Cell 2 | | | | | |
|  | | | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | | T5 |
| NR RF Channel Number | | | |  | 1 | | | | | 1 | | | | | |
| Duplex mode | | | Config 1 |  | FDD | | | | | | | | | | |
|  | | | Config 2,3 |  | TDD | | | | | | | | | | |
| TDD configuration | | | Config 1 |  | Not Applicable | | | | | | | | | | |
|  | | | Config 2 |  | TDDConf.1.1 | | | | | | | | | | |
|  | | | Config 3 |  | TDDConf.2.1 | | | | | | | | | | |
| BWchannel | | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | | | | | |
|  | | | Config 2 |  | 10: NRB,c = 52 | | | | | | | | | | |
|  | | | Config 3 |  | 40: NRB,c = 106 | | | | | | | | | | |
| BWP BW | | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | | | | | |
|  | | | Config 2 |  | 10: NRB,c = 52 | | | | | | | | | | |
|  | | | Config 3 |  | 40: NRB,c = 106 | | | | | | | | | | |
| DRX Cycle | | | | ms | Not Applicable | | | | | | | | | | |
| PDSCH Reference measurement channel | | | Config 1 |  | SR.1.1 FDD | | | | | | | | | | |
|  | | | Config 2 |  | SR.1.1 TDD | | | | | | | | | | |
|  | | | Config 3 |  | SR2.1 TDD | | | | | | | | | | |
| CORESET Reference Channel | | | Config 1 |  | CR.1.1 FDD | | | | | | | | | | |
|  | | | Config 2 |  | CR.1.1 TDD | | | | | | | | | | |
|  | | | Config 3 |  | CR2.1 TDD | | | | | | | | | | |
| TRS configuration | | | Config 1 |  | TRS.1.1 FDD | | | | | | | | | | |
|  | | | Config 2 |  | TRS.1.1 TDD | | | | | | | | | | |
|  | | | Config 3 |  | TRS.1.2 TDD | | | | | | | | | | |
| OCNG Patterns | | | |  | OP.1 | | | | | | | | | | |
| CSI-RS configuration for CSI reporting | | Config 1 | |  | CSI-RS.1.1 FDD | | | | | | | | | | |
| Config 2 | | CSI-RS.1.1 TDD | | | | | | | | | | |
| Config 3 | | CSI-RS.2.1 TDD | | | | | | | | | | |
| SMTC Configuration | | | |  | SMTC.1 | | | | | | | | | | |
| SSB Configuration | | | Config 1,2 |  | SSB.1 FR1 | | | | | | | | | | |
| Config 3 | SSB.2 FR1 | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | Config 1,2 | kHz | 15 kHz | | | | | | | | | | |
| Config 3 | 30 kHz | | | | | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | | Config 1,2 | kHz | 15 kHz | | | | | | | | | | |
| Config 3 | 30 kHz | | | | | | | | | | |
| PRACH configuration | | | |  | FR1 PRACH configuration 1 | | | | | | | | | | |
| BWP configuration | | | Initial DL BWP |  | DLBWP.0.1 | | | | | | | | | | |
|  | | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | | | | | |
|  | | | Initial UL BWP |  | ULBWP.0.1 | | | | | | | | | | |
|  | | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 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 | | | | dBm/15kHz | -98 | | | | | | | | | | |
| Note2 | Config 1,2 | | | dBm/SCS | -98 | | | | | | | | | | |
|  | Config 3 | | | -95 | | | | | | | | | | |
|  | | | | dB | 8 | -1.5 | -1.5 | -1.5 | -1.5 | -Infinity | 0.36 | 0.36 | 0.36 | 0.36 | |
|  | | | | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 9 | 9 | 9 | 9 | |
| SSB\_RP | Config 1,2 | | | dBm/SCS | -90 | -90 | -90 | -90 | -90 | -Infinity | -89 | -89 | -89 | -89 | |
| Config 3 | | | dBm/SCS | -87 | -87 | -87 | -87 | -87 | -Infinity | -86 | -86 | -86 | -86 | |
| IoNote3 | Config 1,2 | | | dBm/  9.36MHz | -61.41 | -58.21 | -58.21 | -58.21 | -58.21 | -61.41 | -58.21 | -58.21 | -58.21 | -58.21 | |
|  | Config 3 | | | dBm/  38.16MHz | -55.31 | -52.11 | -52.11 | -52.11 | -52.11 | -55.31 | -52.11 | -52.11 | -52.11 | -52.11 | |
| Propagation condition | | | |  | 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | | | | |

##### A.6.3.1.7.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

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

NOTE: The target cell add delay Dhandover1 can be expressed as: TRRC\_procedure + Tsearch + TIU + Tprocessing + T∆ + Tmargin, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tsearch, TIU, Tprocessing, T∆ and Tmargin are defined in clause 6.1.1.2.2.

If the target cell is known, then Tsearch = 0 ms

TIU = 20 ms in the test. TIU is defined in clause 6.1.1.2.2.

T∆ = 20 ms in the test. T∆ is defined in clause 6.1.1.2.2.

Tprocessing = 20 ms in the test. Tprocessing is defined in clause 6.1.1.2.2.

Tmargin = 2 ms in the test. Tmargin is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

After successful RACH to cell 2and until the start of time period T4, UE shall be able to receive PDSCH alternatively from cell 1 and cell 2. UE is not expected to transmit UL to both cell 1 and cell 2 in the same TTI.

The UE shall release cell 1 less than Dhandover2 = (TRRC\_procedure + Tinterrupt2) from the beginning of time period T4.

NOTE: Dhandover2 is defined in clause 6.1.3.2.1.

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt2 is defined in clause 6.1.3.2.2.

UE shall not report CSI to cell 1 during T5.

#### A.6.3.1.8 Intra-frequency asynchronous DAPS handover in FR1

##### A.6.3.1.8.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency DAPS handover requirements in asynchronous scenario specified in clause 6.1.3.2.

##### A.6.3.1.8.2 Test Parameters

Supported test configurations are shown in Table A.6.3.1.8.2-1. Both handover delay and interruption length are tested by using the parameters in Table A.6.3.1.8.2-2, and A.6.3.1.8.2-3.

The test consists of five successive time periods, with time durations of T1, T2, T3, T4, and T5 respectively.

Before the start of T1, the UE is connected to the cell1 and not aware of the cell2. The UE shall be configured with periodic CSI reporting for cell1. During T1, the UE does not have any timing information of the cell2.

Starting T2, the cell2 becomes detectable. During T2, the UE performs cell detection and measurements on the cell2 and shall send event report to the network. After receiving the event report A3, the network sends a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing DAPS handover command is sent to the UE. During T3, UE shall be able to perform random access, DL reception or UL transmission in the cell2 while the DL scheduling and UL feedback in the cell1 shall be avoided. After successful RACH procedure of the cell2, UE is scheduled with PDSCH from cell1 and cell2 in alternative TTIs where both cell1 and cell2 belong to the same TAG. In the end the network sends a RRC message implying cell1 release to the UE. During T3, the handover delay Dhandover1 for target cell addition needs to be verified.

The start of T4 is the instant when the last TTI containing cell1 release command is sent to the UE by cell2. During T4, the UE shall accomplish the release actions within Dhandover2.

Starting T5, the UE stops sending the periodical CSI report to the cell1.Table A.6.3.1.8.2-1: Intra-frequency DAPS handover in FR1 test configurations

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

Table A.6.3.1.8.2-2: General test parameters Intra-frequency asynchronous DAPS handover in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 7 μs | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |
| T4 | | ms | Dhandover2 | DHandover2­ is defined in clause 6.1.3.2.1 |
| T5 | | ms | 100 |  |

Table A.6.3.1.8.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency DAPS handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 1 | | | | | Cell 2 | | | | | |
|  | | | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | | T5 |
| NR RF Channel Number | | | |  | 1 | | | | | 1 | | | | | |
| Duplex mode | | Config 1 | |  | FDD | | | | | | | | | | |
|  | | Config 2,3 | |  | TDD | | | | | | | | | | |
| TDD configuration | | Config 1 | |  | Not Applicable | | | | | | | | | | |
|  | | Config 2 | |  | TDDConf.1.1 | | | | | | | | | | |
|  | | Config 3 | |  | TDDConf.2.1 | | | | | | | | | | |
| BWchannel | | Config 1 | | MHz | 10: NRB,c = 52 | | | | | | | | | | |
|  | | Config 2 | |  | 10: NRB,c = 52 | | | | | | | | | | |
|  | | Config 3 | |  | 40: NRB,c = 106 | | | | | | | | | | |
| BWP BW | | Config 1 | | MHz | 10: NRB,c = 52 | | | | | | | | | | |
|  | | Config 2 | |  | 10: NRB,c = 52 | | | | | | | | | | |
|  | | Config 3 | |  | 40: NRB,c = 106 | | | | | | | | | | |
| DRX Cycle | | | | ms | Not Applicable | | | | | | | | | | |
| PDSCH Reference measurement channel | | Config 1 | |  | SR.1.1 FDD | | | | | | | | | | |
|  | | Config 2 | |  | SR.1.1 TDD | | | | | | | | | | |
|  | | Config 3 | |  | SR2.1 TDD | | | | | | | | | | |
| CORESET Reference Channel | | Config 1 | |  | CR.1.1 FDD | | | | | | | | | | |
|  | | Config 2 | |  | CR.1.1 TDD | | | | | | | | | | |
|  | | Config 3 | |  | CR2.1 TDD | | | | | | | | | | |
| TRS configuration | | Config 1 | |  | TRS.1.1 FDD | | | | | | | | | | |
|  | | Config 2 | |  | TRS.1.1 TDD | | | | | | | | | | |
|  | | Config 3 | |  | TRS.1.2 TDD | | | | | | | | | | |
| OCNG Patterns | | | |  | OP.1 | | | | | | | | | | |
| CSI-RS configuration for CSI reporting | | | Config 1 |  | CSI-RS.1.1 FDD | | | | | | | | | | |
| Config 2 | CSI-RS.1.1 TDD | | | | | | | | | | |
| Config 3 | CSI-RS.2.1 TDD | | | | | | | | | | |
| SMTC Configuration | | | |  | SMTC.1 | | | | | | | | | | |
| SSB Configuration | | Config 1,2 | |  | SSB.1 FR1 | | | | | | | | | | |
|  | | Config 3 | |  | SSB.2 FR1 | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | | kHz | 15 kHz | | | | | | | | | | |
| Config 3 | | 30 kHz | | | | | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | | kHz | 15 kHz | | | | | | | | | | |
| Config 3 | | 30 kHz | | | | | | | | | | |
| PRACH configuration | | | |  | FR1 PRACH configuration 1 | | | | | | | | | | |
| BWP configuration | | Initial DL BWP | |  | DLBWP.0.1 | | | | | | | | | | |
|  | | Dedicated DL BWP | |  | DLBWP.1.1 | | | | | | | | | | |
|  | | Initial UL BWP | |  | ULBWP.0.1 | | | | | | | | | | |
|  | | Dedicated UL BWP | |  | ULBWP.1.1 | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 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 | | | | dBm/15kHz | -98 | | | | | | | | | | |
| Note2 | Config 1,2 | | | dBm/SCS | -98 | | | | | | | | | | |
|  | Config 3 | | |  | -95 | | | | | | | | | | |
|  | | | | dB | 8 | -1.5 | -1.5 | -1.5 | -1.5 | -Infinity | 0.36 | 0.36 | 0.36 | 0.36 | |
|  | | | | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 9 | 9 | 9 | 9 | |
| SSB\_RP | Config 1,2 | | | dBm/SCS | -90 | -90 | -90 | -90 | -90 | -Infinity | -89 | -89 | -89 | -89 | |
|  | Config 3 | | | dBm/SCS | -87 | -87 | -87 | -87 | -87 | -Infinity | -86 | -86 | -86 | -86 | |
| IoNote3 | Config 1,2 | | | dBm/  9.36MHz | -61.41 | -58.21 | -58.21 | -58.21 | -58.21 | -61.41 | -58.21 | -58.21 | -58.21 | -58.21 | |
|  | Config 3 | | | dBm/  38.16MHz | -55.31 | -52.11 | -52.11 | -52.11 | -52.11 | -55.31 | -52.11 | -52.11 | -52.11 | -52.11 | |
| Propagation condition | | | |  | 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | | | | |

##### A.6.3.1.8.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

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

NOTE: The target cell add delay Dhandover1 can be expressed as: TRRC\_procedure + Tsearch + TIU + Tprocessing + T∆ + Tmargin, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tsearch, TIU, Tprocessing, T∆ and Tmargin are defined in clause 6.1.1.2.2.

If the target cell is known, then Tsearch = 0 ms

TIU = 20 ms in the test. TIU is defined in clause 6.1.1.2.2.

T∆ = 20 ms in the test. T∆ is defined in clause 6.1.1.2.2.

Tprocessing = 20 ms in the test. Tprocessing is defined in clause 6.1.1.2.2.

Tmargin = 2 ms in the test. Tmargin is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

After successful RACH to cell 2and until the start of time period T4, UE shall be able to receive PDSCH alternatively from cell 1 and cell 2. UE is not expected to transmit UL to both cell 1 and cell 2 in the same TTI.

The UE shall release cell 1 less than Dhandover2 = (TRRC\_procedure + Tinterrupt2) from the beginning of time period T4.

NOTE: Dhandover2 is defined in clause 6.1.3.2.1.

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt2 is defined in clause 6.1.3.2.2.

UE shall not report CSI to cell 1 during T5.

#### A.6.3.1.9 Intra-band inter-frequency synchronous DAPS handover test in SA for FR1

##### A.6.3.1.9.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra-band inter-frequency synchronous DAPS handover requirements specified in clause 6.1.3.2.

##### A.6.3.1.9.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.9.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.9.2-2, and A.6.3.1.9.2-3.

The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2. The UE shall be configured with periodic CSI reporting for cell1. The test scenario comprises of two carriers and one cell on each carrier. Gap pattern ID gp0 as specified in Table 9.1.2-1 is configured before T2 in the test case.

Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

T3 is defined as the end of the last TTI containing the RRC message implying DAPS handover. During T3 UE shall be able to perform random access to cell 2. Cell 1 is continuously scheduled in DL during T3. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perfrom DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. At the end of T3 cell 2 shall send an RRC message implying cell 1 release command.

T4 is defined as the end of the last TTI containing the RRC message implying DAPS handover. Cell 2 is continuously scheduled in DL during T4. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop sending CSI report to the source cell. And the test system shall observe the periodic reporting of CSI for cell 1 during T5.

Table A.6.3.1.9.2-1: Intra-band inter-frequency synchronous DAPS handover in SA for FR1 test configurations

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

Table A.6.3.1.9.2-2: General test parameters for intra-band inter-frequency synchronous DAPS handover test in SA for FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 0 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |
| T4 | | ms | 10 + Tinterrupt2 | Tinterrupt2­ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5 |
| T5 | | ms | 100 |  |

Table A.6.3.1.9.2-3: Cell specific test parameters for intra-band inter-frequency synchronous DAPS handover test in SA for FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | | Cell 2 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number | | |  | 1 | | | | | 2 | | | | |
| Duplex mode | | Config 1 |  | FDD | | | | | | | | | |
|  | | Config 2,3 |  | TDD | | | | | | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | | | | | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | | | | | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | | | | | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | | | | | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | | | | | | | |
|  | | Config 3 |  | SR2.1 TDD | | | | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | | | | | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | | | | | | | |
|  | | Config 3 |  | CR2.1 TDD | | | | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | | | | | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | | | | | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | | | | |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.1.1 FDD | | | | | | | | | |
| Config 2 | CSI-RS.1.1 TDD | | | | | | | | | |
| Config 3 | CSI-RS.2.1 TDD | | | | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | | | | | | | |
|  | | Config 3 |  | SSB.2 FR1 | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 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 | | | dBm/15kHz | -98 | | | | | | | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | | | | | | | |
|  | Config 3 | |  | -95 | | | | | | | | | |
|  | | | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 8 | 8 | 8 | 8 |
|  | | | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 8 | 8 | 8 | 8 |
| SSB\_RP | Config 1,2 | | dBm/SCS | -90 | -90 | -90 | -90 | -90 | -Infinity | -90 | -90 | -90 | -90 |
|  | Config 3 | | dBm/SCS | -87 | -87 | -87 | -87 | -87 | -Infinity | -87 | -87 | -87 | -87 |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -61.41 | -61.41 | -61.41 | -61.41 | -61.41 | -70.05 | -61.41 | -61.41 | -61.41 | -61.41 |
|  | Config 3 | | dBm/  38.16MHz | -55.31 | -55.31 | -55.31 | -55.31 | -55.31 | -63.94 | -55.31 | -55.31 | -55.31 | -55.31 |
| Propagation condition | | | - | AWGN | | | | | 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | | |

##### A.6.3.1.9.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

During T3 UE is allowed to cause Tinterrupt1 interruption to cell 1. Tinterrupt1 is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-2. When UE is transmitting PRACH preamble to cell 2, interruption to cell 1 is allowed.

During T4 UE is allowed to cause Tinterrupt2 interruption to cell 1. Tinterrupt2 is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5.

UE shall finish cell 1 release in T4 and shall not send any CSI reports to cell 1 during T5.

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

#### A.6.3.1.10 Intra-band inter-frequency asynchronous DAPS handover test in SA for FR1

##### A.6.3.1.10.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra-band inter-frequency asynchronous DAPS handover requirements specified in clause 6.1.3.2.

##### A.6.3.1.10.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.10.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.10.2-2, and A.6.3.1.10.2-3.

The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2. The UE shall be configured with periodic CSI reporting for cell1. The test scenario comprises of two carriers and one cell on each carrier. Gap pattern ID gp0 as specified in Table 9.1.2-1 is configured before T2 in the test case.

Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

T3 is defined as the end of the last TTI containing the RRC message implying DAPS handover. During T3 UE shall be able to perform random access to cell 2. Cell 1 is continuously scheduled in DL during T3. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perfrom DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. At the end of T3 cell 2 shall send an RRC message implying cell 1 release command.

T4 is defined as the end of the last TTI containing the RRC message implying DAPS handover. Cell 2 is continuously scheduled in DL during T4. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop sending CSI report to the source cell. And the test system shall observe the periodic reporting of CSI for cell 1 during T5.

Table A.6.3.1.10.2-1: Intra-band inter-frequency asynchronous DAPS handover in SA for FR1 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.6.3.1.10.2-2: General test parameters for intra-band inter-frequency asynchronous DAPS handover test in SA for FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 10 μs | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |
| T4 | | ms | 10 + Tinterrupt2 | Tinterrupt2­ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5 |
| T5 | | ms | 100 |  |

Table A.6.3.1.10.2-3: Cell specific test parameters for intra-band inter-frequency asynchronous DAPS handover test in SA for FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | | Cell 2 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number | | |  | 1 | | | | | 2 | | | | |
| Duplex mode | | Config 1 |  | FDD | | | | | | | | | |
|  | | Config 2,3 |  | TDD | | | | | | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | | | | | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | | | | | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | | | | | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | | | | | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | | | | | | | |
|  | | Config 3 |  | SR2.1 TDD | | | | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | | | | | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | | | | | | | |
|  | | Config 3 |  | CR2.1 TDD | | | | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | | | | | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | | | | | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | | | | |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.1.1 FDD | | | | | | | | | |
| Config 2 | CSI-RS.1.1 TDD | | | | | | | | | |
| Config 3 | CSI-RS.2.1 TDD | | | | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | | | | | | | |
| Config 3 | SSB.2 FR1 | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | | | | |
| Config 3 | 30 kHz | | | | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | | | | |
| Config 3 | 30 kHz | | | | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 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 | | | dBm/15kHz | -98 | | | | | | | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | | | | | | | |
|  | Config 3 | |  | -95 | | | | | | | | | |
|  | | | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 8 | 8 | 8 | 8 |
|  | | | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 8 | 8 | 8 | 8 |
| SSB\_RP | Config 1,2 | | dBm/SCS | -90 | -90 | -90 | -90 | -90 | -Infinity | -90 | -90 | -90 | -90 |
|  | Config 3 | | dBm/SCS | -87 | -87 | -87 | -87 | -87 | -Infinity | -87 | -87 | -87 | -87 |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -61.41 | -61.41 | -61.41 | -61.41 | -61.41 | -70.05 | -61.41 | -61.41 | -61.41 | -61.41 |
|  | Config 3 | | dBm/  38.16MHz | -55.31 | -55.31 | -55.31 | -55.31 | -55.31 | -63.94 | -55.31 | -55.31 | -55.31 | -55.31 |
| Propagation condition | | | - | AWGN | | | | | 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | | |

##### A.6.3.1.10.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

During T3 UE is allowed to cause Tinterrupt1 interruption to cell 1. Tinterrupt1 is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-2. When UE is transmitting PRACH preamble to cell 2, interruption to cell 1 is allowed.

During T4 UE is allowed to cause Tinterrupt2 interruption to cell 1. Tinterrupt2 is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5.

UE shall finish cell 1 release in T4 and shall not send any CSI reports to cell 1 during T5.

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

#### A.6.3.1.11 Inter-band inter-frequency synchronous DAPS handover from FR1 to FR1

##### A.6.3.1.11.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR1 inter-band inter-frequency synchronous DAPS handover requirements specified in clause 6.1.3.2.

##### A.6.3.1.11.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.11.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.11.2-2, A.6.3.1.11.2-3 and A.6.3.1.11.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. The UE shall be configured with periodic CSI reporting for cell1. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC m`essage implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop sending CSI report to the source cell.

Table A.6.3.1.11.2-1: Inter-band inter-frequency synchronous DAPS handover from FR1 to FR1 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 4 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 5 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 7 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 9 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.6.3.1.11.2-2: General test parameters for inter-band inter-frequency synchronous DAPS handover from FR1 to FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | PCell on RF channel number 1 |
|  | Neighbouring cell |  | Cell 2 | Neighbour cell on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 | PCell on RF channel number 2 |
|  | Neighbouring cell |  | Cell 1 | Neighbour cell on RF channel number 1 |
| A3-Offset | | dB | -6 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | | μs | 33 | Synchronous cells |
| DRX | |  | OFF |  |
| Measurement gap pattern Id | |  | #0 | Gaps are configured before T2. |
| T1 | | s | 5 |  |
| T2 | | s | <5 |  |
| T3 | | s | <0.5 |  |
| T4 | | ms | 10+Tinterrupt2 | Tinterrupt2 as defined in Table 6.1.3.2.2-6 for synchronous DAPS HO |
| T5 | | ms | 100 |  |

**Table A.6.3.1.11.2-3: Cell specific test parameters for inter-band inter-frequency synchronous** **DAPS handover from FR1 to FR1 (Cell 1)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Cell 1** | | | | |
|  | | | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| NR RF Channel Number | | | |  | 1 | | | | |
| Duplex mode | | Config 1,4,7 | |  | FDD | | | | |
|  | | Config 2,3,5,6,8,9 | |  | TDD | | | | |
| TDD configuration | | Config 1,4,7 | |  | Not Applicable | | | | |
|  | | Config 2,5,8 | |  | TDDConf.1.1 | | | | |
|  | | Config 3,6,9 | |  | TDDConf.2.1 | | | | |
| BWchannel | | Config 1,4,7 | | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 2,5,8 | |  | 10: NRB,c = 52 | | | | |
|  | | Config 3,6,9 | |  | 40: NRB,c = 106 | | | | |
| BWP BW | | Config 1,4,7 | | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 2,5,8 | |  | 10: NRB,c = 52 | | | | |
|  | | Config 3,6,9 | |  | 40: NRB,c = 106 | | | | |
| TRS configuration | | Config 1,4,7 | |  | TRS.1.1 FDD | | | | |
|  | | Config 2,5,8 | |  | TRS.1.1 TDD | | | | |
|  | | Config 3,6,9 | |  | TRS.1.2 TDD | | | | |
| DRX Cycle | | | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | | Config 1,4,7 | |  | SR.1.1 FDD | | | | |
|  | | Config 2,5,8 | |  | SR.1.1 TDD | | | | |
|  | | Config 3,6,9 | |  | SR2.1 TDD | | | | |
| CORESET Reference Channel | | Config 1,4,7 | |  | CR.1.1 FDD | | | | |
|  | | Config 2,5,8 | |  | CR.1.1 TDD | | | | |
|  | | Config 3,6,9 | |  | CR2.1 TDD | | | | |
| OCNG Patterns | | | |  | OCNG pattern 1 | | | | |
| CSI-RS configuration for CSI reporting | | | Config 1,4,7 |  | CSI-RS.1.1 FDD | | | | |
| Config 2,5,8 | CSI-RS.1.1 TDD | | | | |
| Config 3,6,9 | CSI-RS.2.1 TDD | | | | |
| SMTC Configuration | | | |  | SMTC pattern 1 | | | | |
| SSB Configuration | | Config 1,2,4,5,7,8 | |  | SSB.1 FR1 | | | | |
| Config 3,6,9 | | SSB.2 FR1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,4,5,7,8 | | kHz | 15 kHz | | | | |
| Config 3,6,9 | | 30 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2,4,5,7,8 | | kHz | 15 kHz | | | | |
| Config 3,6,9 | | 30 kHz | | | | |
| PRACH configuration | | | |  | FR1 PRACH configuration 2 | | | | |
| BWP | | Initial DL BWP | |  | DLBWP.0.1 | | | | |
|  | | Dedicated DL BWP | |  | DLBWP.1.3 | | | | |
|  | | Initial UL BWP | |  | ULBWP.0.1 | | | | |
|  | | Dedicated UL BWP | |  | ULBWP.1.3 | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 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 | | | | dBm/15kHz | -98 | -98 | -98 | -98 | -98 |
| Note2 | Config 1,2,4,5,7,8 | | | dBm/SCS | -98 | -98 | -98 | -98 | -98 |
|  | Config 3,6,9 | | |  | -95 | -95 | -95 | -95 | -95 |
|  | | | | dB | 4 | 4 | 4 | 4 | 4 |
|  | | | | dB | 4 | 4 | 4 | 4 | 4 |
| SSB\_RP | Config 1,2,4,5,7,8 | | | dBm/SCS | -94 | -94 | -94 | -94 | -94 |
|  | Config 3,6,9 | | | dBm/SCS | -91 | -91 | -91 | -91 | -91 |
| IoNote3 | Config 1,2,4,5,7,8 | | | dBm/  9.36MHz | -64.59 | -64.59 | -64.59 | -64.59 | -64.59 |
|  | Config 3,6,9 | | | dBm/  38.16MHz | -58.49 | -58.49 | -58.49 | -58.49 | -58.49 |
| Propagation condition | | | | - | AWGN | | | | |
| Note 1: OCNG shall be used such that the cell is 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

**Table A.6.3.1.11.2-4: Cell specific test parameters for inter-band inter-frequency synchronous DAPS handover from FR1 to FR1 (Cell 2)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number | | |  | 2 | | | | |
| Duplex mode | | Config 1,2,3 |  | FDD | | | | |
|  | | Config 4,5,6,7,8,9 |  | TDD | | | | |
| TDD configuration | | Config 1,2,3 |  | Not Applicable | | | | |
|  | | Config 4,5,6 |  | TDDConf.1.1 | | | | |
|  | | Config 7,8,9 |  | TDDConf.2.1 | | | | |
| BWchannel | | Config 1,2,3 | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 4,5,6 |  | 10: NRB,c = 52 | | | | |
|  | | Config 7,8,9 |  | 40: NRB,c = 106 | | | | |
| BWP BW | | Config 1,2,3 | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 4,5,6 |  | 10: NRB,c = 52 | | | | |
|  | | Config 7,8,9 |  | 40: NRB,c = 106 | | | | |
| TRS configuration | | Config 1,2,3 |  | TRS.1.1 FDD | | | | |
|  | | Config 4,5,6 |  | TRS.1.1 TDD | | | | |
|  | | Config 7,8,9 |  | TRS.1.2 TDD | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | | Config 1,2,3 |  | SR.1.1 FDD | | | | |
|  | | Config 4,5,6 |  | SR.1.1 TDD | | | | |
|  | | Config 7,8,9 |  | SR2.1 TDD | | | | |
| CORESET Reference Channel | | Config 1,2,3 |  | CR.1.1 FDD | | | | |
|  | | Config 4,5,6 |  | CR.1.1 TDD | | | | |
|  | | Config 7,8,9 |  | CR2.1 TDD | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | |
| CSI-RS configuration for CSI reporting | | Config 1,2,3 |  | CSI-RS.1.1 FDD | | | | |
| Config 4,5,6 | CSI-RS.1.1 TDD | | | | |
| Config 7,8,9 | CSI-RS.2.1 TDD | | | | |
| SMTC Configuration | |  |  | SMTC pattern 1 | | | | |
| SSB Configuration | | Config 1,2,3,4,5,6 |  | SSB.1 FR1 | | | | |
| Config 7,8,9 | SSB.2 FR1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,3,4,5,6 | kHz | 15 kHz | | | | |
| Config 7,8,9 | 30 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2,3,4,5,6 | kHz | 15 kHz | | | | |
| Config 7,8,9 | 30 kHz | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 2 | | | | |
| BWP | | Initial DL BWP |  | DLBWP.0.1 | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.3 | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.3 | | | | |
| EPRE ratio of PSS to SSS | | | dB | 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 | | | dBm/15kHz | -98 | -98 | -98 | -98 | -98 |
| Note2 | Config 1,2,3,4,5,6 | | dBm/SCS | -98 | -98 | -98 | -98 | -98 |
|  | Config 7,8,9 | |  | -95 | -95 | -95 | -95 | -95 |
|  | | | dB | -Infinity | 4 | 4 | 4 | 4 |
|  | | | dB | -Infinity | 4 | 4 | 4 | 4 |
| SSB\_RP | Config 1,2,3,4,5,6 | | dBm/SCS | -Infinity | -94 | -94 | -94 | -94 |
|  | Config 7,8,9 | | dBm/SCS | -Infinity | -91 | -91 | -91 | -91 |
| IoNote3 | Config 1,2,3,4,5,6 | | dBm/  9.36MHz | -70.05 | -64.59 | -64.59 | -64.59 | -64.59 |
|  | Config 7,8,9 | | dBm/  38.16MHz | -63.94 | -58.49 | -58.49 | -58.49 | -58.49 |
| Propagation condition | | | - | AWGN | | | | |
| Note 1: OCNG shall be used such that the cell is 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

##### A.6.3.1.11.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 72 ms from the beginning of time period T3. During Dhandover1, the interruption on Cell 1 shall not exceed Tinterrupt1 as defined in Table 6.1.3.2.2-3 for synchronous DAPS HO.

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

NOTE: The handover delay Dhandover1 can be expressed as: TRRC\_procedure + TIU + Tprocessing + T∆ + Tmargin, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

TIU = 20 ms in the test. TIU is defined in clause 6.1.1.2.2.

T∆ = 20 ms in the test. T∆ is defined in clause 6.1.1.2.2.

Tprocessing = 20 ms in the test. Tprocessing is defined in clause 6.1.1.2.2.

Tmargin = 2 ms in the test. Tmargin is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

The UE shall complete to release Cell 1 less than (10 ms + Tinterrupt2) from the beginning of time period T4. During Dhandover2, the interruptionon Cell 2 shall not exceed Tinterrupt2 as defined in Table 6.1.3.2.2-6 for synchronous DAPS HO.

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

NOTE: The handover delay Dhandover2 can be expressed as: TRRC\_procedure + Tinterrupt2, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

#### A.6.3.1.12 Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1

##### A.6.3.1.12.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR1 inter-band inter-frequency asynchronous DAPS handover requirements specified in clause 6.1.3.2.

##### A.6.3.1.12.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.12.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.12.2-2, A.6.3.1.12.2-3 and A.6.3.1.12.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. The UE shall be configured with periodic CSI reporting for cell1. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop sending CSI report to the source cell.

Table A.6.3.1.12.2-1: Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 4 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 5 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 7 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 8 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 9 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.6.3.1.12.2-2: General test parameters for inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
| Initial conditions | Active cell | |  | Cell 1 |  |
|  | Neighbouring cell | |  | Cell 2 |  |
| Final condition | Active cell | |  | Cell 2 |  |
| A3-Offset | | | dB | -4 |  |
| Hysteresis | | | dB | 0 |  |
| Time To Trigger | | | s | 0 |  |
| Filter coefficient | | |  | 0 | L3 filtering is not used |
| Access Barring Information | | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | | Config 1,2,4,5 | ms | 0.5 | Asynchronous cells |
|  | | Config3,6,7,8,9 | ms | 0.25 |
| DRX | | |  | OFF |  |
| Measurement gap pattern Id | | |  | #0 | Gaps are configured before T2. |
| T1 | | | s | 5 |  |
| T2 | | | s | <5 |  |
| T3 | | | s | <0.5 |  |
| T4 | | | ms | 10+Tinterrupt2 | Tinterrupt2 as defined in Table 6.1.3.2.2-6 for asynchronous DAPS HO. |
| T5 | | | ms | 100 |  |

Table A.6.3.1.12.2-3: Cell specific test parameters for inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1 (Cell 1)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 1 | | | | |
|  | | | |  | T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number | | | |  | 1 | | | | |
| Duplex mode | | Config 1,4,7 | |  | FDD | | | | |
|  | | Config 2,3,5,6,8,9 | |  | TDD | | | | |
| TDD configuration | | Config 1,4,7 | |  | Not Applicable | | | | |
|  | | Config 2,5,8 | |  | TDDConf.1.1 | | | | |
|  | | Config 3,6,9 | |  | TDDConf.2.1 | | | | |
| BWchannel | | Config 1,4,7 | | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 2,5,8 | |  | 10: NRB,c = 52 | | | | |
|  | | Config 3,6,9 | |  | 40: NRB,c = 106 | | | | |
| BWP BW | | Config 1,4,7 | | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 2,5,8 | |  | 10: NRB,c = 52 | | | | |
|  | | Config 3,6,9 | |  | 40: NRB,c = 106 | | | | |
| TRS configuration | | Config 1,4,7 | |  | TRS.1.1 FDD | | | | |
|  | | Config 2,5,8 | |  | TRS.1.1 TDD | | | | |
|  | | Config 3,6,9 | |  | TRS.1.2 TDD | | | | |
| DRX Cycle | | | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | | Config 1,4,7 | |  | SR.1.1 FDD | | | | |
|  | | Config 2,5,8 | |  | SR.1.1 TDD | | | | |
|  | | Config 3,6,9 | |  | SR2.1 TDD | | | | |
| CORESET Reference Channel | | Config 1,4,7 | |  | CR.1.1 FDD | | | | |
|  | | Config 2,5,8 | |  | CR.1.1 TDD | | | | |
|  | | Config 3,6,9 | |  | CR2.1 TDD | | | | |
| OCNG Patterns | | | |  | OCNG pattern 1 | | | | |
| CSI-RS configuration for CSI reporting | | | Config 1,4,7 |  | CSI-RS.1.1 FDD | | | | |
| Config 2,5,8 | CSI-RS.1.1 TDD | | | | |
| Config 3,6,9 | CSI-RS.2.1 TDD | | | | |
| SMTC Configuration | | | |  | SMTC pattern 1 | | | | |
| SSB Configuration | | Config 1,2,4,5,7,8 | |  | SSB.1 FR1 | | | | |
|  | | Config 3,6,9 | |  | SSB.2 FR1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,4,5,7,8 | | kHz | 15 kHz | | | | |
|  | | Config 3,6,9 | |  | 30 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2,4,5,7,8 | | kHz | 15 kHz | | | | |
|  | | Config 3,6,9 | |  | 30 kHz | | | | |
| PRACH configuration | | | |  | FR1 PRACH configuration 2 | | | | |
| BWP | | Initial DL BWP | |  | DLBWP.0.1 | | | | |
|  | | Dedicated DL BWP | |  | DLBWP.1.3 | | | | |
|  | | Initial UL BWP | |  | ULBWP.0.1 | | | | |
|  | | Dedicated UL BWP | |  | ULBWP.1.3 | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 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 | | | | dBm/15kHz | -98 | -98 | -98 | -98 | -98 |
| Note2 | Config 1,2,4,5,7,8 | | | dBm/SCS | -98 | -98 | -98 | -98 | -98 |
|  | Config 3,6,9 | | |  | -95 | -95 | -95 | -95 | -95 |
|  | | | | dB | 4 | 4 | 4 | 4 | 4 |
|  | | | | dB | 4 | 4 | 4 | 4 | 4 |
| SSB\_RP | Config 1,2,4,5,7,8 | | | dBm/SCS | -94 | -94 | -94 | -94 | -94 |
|  | Config 3,6,9 | | | dBm/SCS | -91 | -91 | -91 | -91 | -91 |
| IoNote3 | Config 1,2,4,5,7,8 | | | dBm/  9.36MHz | -64.59 | -64.59 | -64.59 | -64.59 | -64.59 |
|  | Config 3,6,9 | | | dBm/  38.16MHz | -58.49 | -58.49 | -58.49 | -58.49 | -58.49 |
| Propagation condition | | | | - | AWGN | | | | |
| Note 1: OCNG shall be used such that the cell is 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

Table A.6.3.1.12.2-4: Cell specific test parameters for inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1 (Cell 2)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Cell 2** | | | | |
|  | | | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| NR RF Channel Number | | | |  | 2 | | | | |
| Duplex mode | | Config 1,2,3 | |  | FDD | | | | |
|  | | Config 4,5,6,7,8,9 | |  | TDD | | | | |
| TDD configuration | | Config 1,2,3 | |  | Not Applicable | | | | |
|  | | Config 4,5,6 | |  | TDDConf.1.1 | | | | |
|  | | Config 7,8,9 | |  | TDDConf.2.1 | | | | |
| BWchannel | | Config 1,2,3 | | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 4,5,6 | |  | 10: NRB,c = 52 | | | | |
|  | | Config 7,8,9 | |  | 40: NRB,c = 106 | | | | |
| BWP BW | | Config 1,2,3 | | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 4,5,6 | |  | 10: NRB,c = 52 | | | | |
|  | | Config 7,8,9 | |  | 40: NRB,c = 106 | | | | |
| TRS configuration | | Config 1,2,3 | |  | TRS.1.1 FDD | | | | |
|  | | Config 4,5,6 | |  | TRS.1.1 TDD | | | | |
|  | | Config 7,8,9 | |  | TRS.1.2 TDD | | | | |
| DRx Cycle | | | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | | Config 1,2,3 | |  | SR.1.1 FDD | | | | |
|  | | Config 4,5,6 | |  | SR.1.1 TDD | | | | |
|  | | Config 7,8,9 | |  | SR2.1 TDD | | | | |
| CORESET Reference Channel | | Config 1,2,3 | |  | CR.1.1 FDD | | | | |
|  | | Config 4,5,6 | |  | CR.1.1 TDD | | | | |
|  | | Config 7,8,9 | |  | CR2.1 TDD | | | | |
| OCNG Patterns | | | |  | OCNG pattern 1 | | | | |
| CSI-RS configuration for CSI reporting | | | Config 1,2,3 |  | CSI-RS.1.1 FDD | | | | |
| Config 4,5,6 | CSI-RS.1.1 TDD | | | | |
| Config 7,8,9 | CSI-RS.2.1 TDD | | | | |
| SMTC Configuration | | | |  | SMTC pattern 1 | | | | |
| SSB Configuration | | Config 1,2,3,4,5,6 | |  | SSB.1 FR1 | | | | |
|  | | Config 7,8,9 | |  | SSB.2 FR1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2,3,4,5,6 | | kHz | 15 kHz | | | | |
|  | | Config 7,8,9 | |  | 30 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2,3,4,5,6 | | kHz | 15 kHz | | | | |
|  | | Config 7,8,9 | |  | 30 kHz | | | | |
| PRACH configuration | | | |  | FR1 PRACH configuration 2 | | | | |
| BWP | | Initial DL BWP | |  | DLBWP.0.1 | | | | |
|  | | Dedicated DL BWP | |  | DLBWP.1.3 | | | | |
|  | | Initial UL BWP | |  | ULBWP.0.1 | | | | |
|  | | Dedicated UL BWP | |  | ULBWP.1.3 | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 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 | | | | dBm/15kHz | -98 | -98 | -98 | -98 | -98 |
| Note2 | Config 1,2,3,4,5,6 | | | dBm/SCS | -98 | -98 | -98 | -98 | -98 |
|  | Config 7,8,9 | | |  | -95 | -95 | -95 | -95 | -95 |
|  | | | | dB | -Infinity | 4 | 4 | 4 | 4 |
|  | | | | dB | -Infinity | 4 | 4 | 4 | 4 |
| SSB\_RP | Config 1,2,3,4,5,6 | | | dBm/SCS | -Infinity | -94 | -94 | -94 | -94 |
| Config 7,8,9 | | | dBm/SCS | -Infinity | -91 | -91 | -91 | -91 |
| IoNote3 | Config 1,2,3,4,5,6 | | | dBm/  9.36MHz | -70.05 | -64.59 | -64.59 | -64.59 | -64.59 |
|  | Config 7,8,9 | | | dBm/  38.16MHz | -63.94 | -58.49 | -58.49 | -58.49 | -58.49 |
| Propagation condition | | | | - | AWGN | | | | |
| Note 1: OCNG shall be used such that the cell is 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

##### A.6.3.1.12.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 72 ms from the beginning of time period T3. During Dhandover1, the interruption on Cell 1 shall not exceed Tinterrupt1 as defined in Table 6.1.3.2.2-3 for asynchronous DAPS HO.

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

NOTE: The handover delay Dhandover1 can be expressed as: TRRC\_procedure + TIU + Tprocessing + T∆ + Tmargin, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

TIU = 20 ms in the test. TIU is defined in clause 6.1.1.2.2.

T∆ = 20 ms in the test. T∆ is defined in clause 6.1.1.2.2.

Tprocessing = 20 ms in the test. Tprocessing is defined in clause 6.1.1.2.2.

Tmargin = 2 ms in the test. Tmargin is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

The UE shall complete to release Cell 1 less than (10 ms + Tinterrupt2) from the beginning of time period T4. During Dhandover2, the interruptionon Cell 2 shall not exceed Tinterrupt2 as defined in Table 6.1.3.2.2-6 for asynchronous DAPS HO.

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

NOTE: The handover delay Dhandover2 can be expressed as: TRRC\_procedure + Tinterrupt2, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

**< End of change 24>**

**< Start of change 25 (from - R4-2209613) >**

**< Unchanged sections omitted >**

Table A.6.5.5.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Value | Comment |
|  | | | | |  | Test 1 |  |
| Active PSCell | | | | |  | Cell 1 |  |
| RF Channel Number | | | | |  | 1 |  |
| Duplex mode | | | | Config 1 |  | FDD |  |
|  | | | | Config 2, 3 |  | TDD |  |
| BWchannel | | | | Config 1 | MHz | 10: NRB,c = 52 |  |
|  | | | | Config 2 |  | 10: NRB,c = 52 |  |
|  | | | | Config 3 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | | Config 1, 2, 3 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config 1, 2, 3 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1, 2, 3 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1, 2, 3 |  | ULBWP.1.1 |  |
| TDD Configuration | | | | Config 1 |  | Not Applicable |  |
|  | | | | Config 2 |  | TDDConf.1.1 |  |
|  | | | | Config 3 |  | TDDConf.2.1 |  |
| RMSI CORESET Reference Channel | | | | Config 1 |  | CR.1.1 FDD |  |
|  | | | | Config 2 |  | CR.1.1 TDD |  |
|  | | | | Config 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | | | Config 1 |  | CCR.1.1 FDD |  |
|  | | | | Config 2 |  | CCR.1.1 TDD |  |
|  | | | | Config 3 |  | CCR.2.1 TDD |  |
| SSB Configuration | | | | Config 1 |  | SSB.3 FR1 |  |
|  | | | | Config 2 |  | SSB.3 FR1 |  |
|  | | | | Config 3 |  | SSB.4 FR1 |  |
| SMTC Configuration | | | | Config 1, 2 |  | SMTC.1 |  |
|  | | | | Config 3 |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1, 2 |  | 15 KHz |  |
|  | | | | Config 3 |  | 30 KHz |  |
| PRACH Configuration | | | | Config 1, 2 |  | Table A.3.8.2.2-1 |  |
|  | | | | Config 3 |  | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | | DCI format | | |  | 1-0 |  |
|  | | Number of Control OFDM symbols | | |  | 2 |  |
|  | | Aggregation level | | | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size |  |
|  | | REG bundle size | | |  | 6 |  |
| DRX | | | | |  | OFF |  |
| Gap pattern ID | | | | |  | gp0 |  |
| gapOffset | | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2 | | | | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
|  | Config 3 | | | |  | -95 |  |
| powerControlOffsetSS | | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for CSI reporting | | | Config 1 | |  | CSI-RS.1.1 FDD |  |
|  | | | Config 2 | |  | CSI-RS.1.1 TDD |  |
|  | | | Config 3 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | | Config 1 | |  | TRS.1.1 FDD |  |
|  | | | Config 2 | |  | TRS.1.1 TDD |  |
|  | | | Config 3 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | |  | |  | 0, 1 |  |
| T310 Timer | | |  | | ms | 1000 |  |
| N310 | | |  | |  | 2 |  |
| T1 | | | | | s | 0.2 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | 0.37 |  |
| T3 | | | | | s | 0.24 |  |
| T4 | | | | | s | 0 |  |
| T5 | | | | | s | 0.17 |  |
| D1 | | | | | s | 0.13 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | | |

**< End of change 25>**

**< Start of change 26 (from - R4-2209613) >**

**< Unchanged sections omitted >**

Table A.6.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value | Comment |
|  | | | |  | Test 1 |  |
| Active PSCell | | | |  | Cell 1 |  |
| RF Channel Number | | | |  | 1 |  |
| Duplex mode | | | Config 1 |  | FDD |  |
|  | | | Config 2, 3 |  | TDD |  |
| BWchannel | | | Config 1 | MHz | 10: NRB,c = 52 |  |
|  | | | Config 2 |  | 10: NRB,c = 52 |  |
|  | | | Config 3 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | Config 1, 2, 3 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | Config 1, 2, 3 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | Config 1, 2, 3 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | Config 1, 2, 3 |  | ULBWP.1.1 |  |
| TDD Configuration | | | Config 1 |  | Not Applicable |  |
|  | | | Config 2 |  | TDDConf.1.1 |  |
|  | | | Config 3 |  | TDDConf.2.1 |  |
| RMSI CORESET Reference Channel | | | Config 1 |  | CR.1.1 FDD |  |
|  | | | Config 2 |  | CR.1.1 TDD |  |
|  | | | Config 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | | Config 1 |  | CCR.1.1 FDD |  |
|  | | | Config 2 |  | CCR.1.1 TDD |  |
|  | | | Config 3 |  | CCR.2.1 TDD |  |
| SSB Configuration | | | Config 1 |  | SSB.3 FR1 |  |
|  | | | Config 2 |  | SSB.3 FR1 |  |
|  | | | Config 3 |  | SSB.4 FR1 |  |
| SMTC Configuration | | | Config 1, 2 |  | SMTC.1 |  |
|  | | | Config 3 |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2 |  | 15 KHz |  |
|  | | | Config 3 |  | 30 KHz |  |
| PRACH Configuration | | | Config 1, 2 |  | Table A.3.8.2.2-1 |  |
|  | | | Config 3 |  | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | |  | 1 |  |
| OCNG parameters | | | |  | OP.1 |  |
| CP length | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | | DCI format | |  | 1-0 |  |
|  | | Number of Control OFDM symbols | |  | 2 |  |
|  | | Aggregation level | | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |  |
|  | | DMRS precoder granularity | |  | REG bundle size |  |
|  | | REG bundle size | |  | 6 |  |
| DRX | | | |  | DRX.7 | A.3.3.7 |
| Gap pattern ID | | | |  | N.A. |  |
| rlmInSyncOutOfSyncThreshold | | | |  | Absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2 | | | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
|  | Config 3 | | |  | -95 |  |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for CSI reporting | | Config 1 | |  | CSI-RS.1.1 FDD |  |
|  | | Config 2 | |  | CSI-RS.1.1 TDD |  |
|  | | Config 3 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | Config 1 | |  | TRS.1.1 FDD |  |
|  | | Config 2 | |  | TRS.1.1 TDD |  |
|  | | Config 3 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | |  | |  | 0, 1 |  |
| T310 Timer | |  | | ms | 1000 |  |
| N310 | |  | |  | 2 |  |
| T1 | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 5.17 |  |
| T3 | | | | s | 3.24 |  |
| T4 | | | | s | 0 |  |
| T5 | | | | s | 1.97 |  |
| D1 | | | | s | 1.93 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | |

**< End of change 26>**

**< Start of change 27 (from - R4-2209613) >**

**< Unchanged sections omitted >**

Table A.6.5.5.3.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value | Comment |
|  | | | |  | Test 1 |  |
| Active PCell | | | |  | Cell 1 |  |
| RF Channel Number | | | |  | 1 |  |
| Duplex mode | Config 1 | | |  | FDD |  |
|  | Config 2, 3 | | |  | TDD |  |
| TDD Configuration | Config 1 | | |  | Not Applicable |  |
|  | Config 2 | | |  | TDDConf.1.1 |  |
|  | Config 3 | | |  | TDDConf.2.1 |  |
| RMSI CORESET Reference Channel | Config 1 | | |  | CR.1.1 FDD | A.3.1.2 |
|  | Config 2 | | |  | CR.1.1 TDD |  |
|  | Config 3 | | |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | Config 1 | | |  | CCR.1.1 FDD | A.3.1.3 |
|  | Config 2 | | |  | CCR.1.1 TDD |  |
|  | Config 3 | | |  | CCR.2.1 TDD |  |
| SSB Configuration | Config 1 | | |  | SSB.3 FR1 | A.3.10 |
|  | Config 2 | | |  | SSB.3 FR1 |  |
|  | Config 3 | | |  | SSB.4 FR1 |  |
| SMTC Configuration | Config 1, 2 | | |  | SMTC.1 | A.3.11 |
|  | Config 3 | | |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2 | | |  | 15 KHz |  |
|  | Config 3 | | |  | 30 KHz |  |
| PRACH  Configuration | Config 1, 2 | | |  | FR1 PRACH configuration 4 | A.3.8.2 |
| Config 3 | | |  | FR1 PRACH configuration 4 | A.3.8.2 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | | | |  | 0 |  |
| OCNG parameters | | | |  | OP.1 | A.3.2.1 |
| CP length | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | DCI format | | |  | 1-0 |  |
|  | Number of Control OFDM symbols | | |  | 2 |  |
|  | Aggregation level | | | CCE | 8 |  |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 0 |  |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 0 |  |
|  | DMRS precoder granularity | | |  | REG bundle size |  |
|  | REG bundle size | | |  | 6 |  |
| DRX | | | |  | OFF |  |
| Gap pattern ID | | | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | | | |  | 1 | N |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | Config 1, 2 | | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
|  | | Config 3 | |  | -95 |  |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for q0 and q1 | | | Config 1 |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | | Config 2 | CSI-RS.1.2 TDD |  |
|  | | | Config 3 | CSI-RS.2.2 TDD |  |
| CSI-RS configuration for CSI reporting | | | Config 1 |  | CSI-RS.1.1 FDD | A.3.14 |
|  | | | Config 2 |  | CSI-RS.1.1 TDD |  |
|  | | | Config 3 |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | | Config 1 |  | TRS.1.1 FDD |  |
|  | | | Config 2 |  | TRS.1.1 TDD |  |
|  | | | Config 3 |  | TRS.1.2 TDD |  |
| CSI-RS-Index assigned as RLM RS | | | Config 1 |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | | Config 2 |  | CSI-RS.1.2 TDD |  |
|  | | | Config 3 |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | | ms | 1000 |  |
| N310 | | | |  | 2 |  |
| T1 | | | | s | 0.2 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 0.18 |  |
| T3 | | | | s | 0.14 |  |
| T4 | | | | s | 0 |  |
| T5 | | | | s | 0.08 |  |
| D1 | | | | s | 0.04 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | |

**< End of change 27>**

**< Start of change 28 (from - R4-2209613) >**

**< Unchanged sections omitted >**

Table A.6.5.5.4.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
|  | | |  | Test 1 |  |
| Active PCell | | |  | Cell 1 |  |
| RF Channel Number | | |  | 1 |  |
| Duplex mode | Config 1 | |  | FDD |  |
|  | Config 2, 3 | |  | TDD |  |
| TDD Configuration | Config 1 | |  | Not Applicable |  |
|  | Config 2 | |  | TDDConf.1.1 |  |
|  | Config 3 | |  | TDDConf..21 |  |
| RMSI CORESET Reference Channel | Config 1 | |  | CR.1.1 FDD | A.3.1.2 |
|  | Config 2 | |  | CR.1.1 TDD |
|  | Config 3 | |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 | |  | CCR.1.1 FDD | A.3.1.3 |
|  | Config 2 | |  | CCR.1.1 TDD |
|  | Config 3 | |  | CCR.2.1 TDD |
| SSB Configuration | Config 1 | |  | SSB.3 FR1 | A.3.10 |
|  | Config 2 | |  | SSB.3 FR1 |
|  | Config 3 | |  | SSB.4 FR1 |
| SMTC Configuration | Config 1, 2 | |  | SMTC.1 | A.3.11 |
|  | Config 3 | |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2 | |  | 15 KHz |  |
|  | Config 3 | |  | 30 KHz |  |
| PRACH  Configuration | Config 1, 2 | |  | FR1 PRACH configuration 4 | A.3.8.2 |
| Config 3 | |  | FR1 PRACH configuration 4 | A.3.8.2 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | | |  | 0 |  |
| OCNG parameters | | |  | OP.1 | A.3.2.1 |
| CP length | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | DCI format | |  | 1-0 |  |
|  | Number of Control OFDM symbols | |  | 2 |  |
|  | Aggregation level | | CCE | 8 |  |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | dB | 0 |  |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | dB | 0 |  |
|  | DMRS precoder granularity | |  | REG bundle size |  |
|  | REG bundle size | |  | 6 |  |
| DRX | | |  | DRX.7 | A.3.3.7 |
| Gap pattern ID | | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | Config 1, 2 | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
|  | | Config 3 |  | -95 |  |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for q0 and q1 | Config 1 | |  | CSI-RS.1.2 FDD | A.3.14  .1 |
|  | Config 2 | |  | CSI-RS.1.2 TDD |  |
|  | Config 3 | |  | CSI-RS.2.2 TDD |  |
| CSI-RS configuration for CSI reporting | Config 1 | |  | CSI-RS.1.1 FDD | A.3.14.1 |
|  | Config 2 | |  | CSI-RS.1.1 TDD |  |
|  | Config 3 | |  | CSI-RS.2.1 TDD |  |
| TRS configuration | Config 1 | |  | TRS.1.1 FDD |  |
|  | Config 2 | |  | TRS.1.1 TDD |  |
|  | Config 3 | |  | TRS.1.2 TDD |  |
| CSI-RS-Index assigned as RLM RS | Config 1 | |  | CSI-RS.1.2 FDD |  |
|  | Config 2 | |  | CSI-RS.1.2 TDD |  |
|  | Config 3 | |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 8.37 |  |
| T3 | | | s | 6.44 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 1.97 |  |
| D1 | | | s | 1.93 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

**< End of change 28>**

**< Start of change 29 (from - R4-2210979) >**

#### A.6.5.5.5 Beam Failure Detection and Link Recovery Test for FR1 SCell configured with CSI-RS-based BFD and SSB-based LR in non-DRX mode

##### A.6.5.5.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP without *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.5.1-1, A.6.5.5.5.1-2, and below. There are two cells, cell 1 is the PCell and cell 2 is the SCell, in the test. UE is not provided by *schedulingRequestID-BFR-SCell-r16*, i.e., no configuration for PUCCH transmission resources, and UE shall perform the random access procedure to recover the beam failure. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.5.1-1 shows the SNR of the CSI-RS in set q0 in the active SCell to emulate beam failure. Figure A.6.5.5.5.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.6.5.5.5.1-1: Supported test configurations for FR1 PCell and SCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 2 | TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 3 | TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.6.5.5.5.1-2: General test parameters for FR1 SCell for beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** | **Comment** |
| **Test 1** |
| Active PCell | | | |  | Cell 1 |  |
| RF Channel Number for PCell | | | |  | 1 |  |
| Active SCell | | | |  | Cell 2 |  |
| RF Channel Number for SCell | | | |  | 2 |  |
| Duplex mode | Config 1 | | |  | FDD |  |
| Config 2, 3 | | | TDD |  |
| BW channel | Config 1 | | |  | 10: NRB,c = 52 |  |
| Config 2 | | | MHz | 10: NRB,c = 52 |  |
| Config 3 | | |  | 40: NRB,c = 106 |  |
| TDD Configuration | Config 1 | | |  | Not Applicable |  |
| Config 2 | | | TDDConf.1.1 |  |
| Config 3 | | | TDDConf.2.1 |  |
| CORESET Reference Channel | Config 1 | | |  | CR.1.1 FDD | A.3.1.2 |
| Config 2 | | | CR.1.1 TDD |
| Config 3 | | | CR.2.1 TDD |
| SSB Configuration | Config 1 | | |  | SSB.1 FR1 | A.3.10 |
| Config 2 | | | SSB.1 FR1 |
| Config 3 | | | SSB.2 FR1 |
| SMTC Configuration | Config 1, 2 | | |  | SMTC.1 | A.3.11 |
| Config 3 | | | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2 | | | kHz | 15 |  |
| Config 3 | | | 30 |  |
| PRACH Configuration | Config 1, 2 | | |  | Table A.3.8.2.2-1 |  |
| Config 3 | | |  | Table A.3.8.2.2-1 |  |
| csi-RS-Index assigned as beam failure detection RS in set q0 in activated SCell | | | |  | 0 |  |
| OCNG parameters | | | |  | OP.1 | A.3.2.1 |
| CP length | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | DCI format | | |  | 1-0 |  |
| Number of Control OFDM symbols | | |  | 2 |  |
| Aggregation level | | | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 0 |  |
| DMRS precoder granularity | | |  | REG bundle size |  |
| REG bundle size | | |  | 6 |  |
| DRX | | | |  | OFF |  |
| Gap pattern ID | | | |  | N.A. |  |
| schedulingRequestID-BFR-SCell-r16 | | | |  | absent | When the field is absent, the random access procedure will be triggered for SCell BFR |
| SSB Index assigned as CBD RS (q1) in activated SCell | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdBFR | | Config 1, 2 | | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
| Config 3 | | -95 |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for q0 in activated SCell | | | Config 1 |  | CSI-RS.1.2 FDD | A.3.14 |
| Config 2 | CSI-RS.1.2 TDD |
| Config 3 | CSI-RS.2.2 TDD |
| CSI-RS configuration for CSI reporting | | | Config 1 |  | CSI-RS.1.1 FDD | A.3.14 |
| Config 2 |  | CSI-RS.1.1 TDD |
| Config 3 |  | CSI-RS.2.1 TDD |
| TRS configuration | | | Config 1 |  | TRS.1.1 FDD |  |
| Config 2 |  | TRS.1.1 TDD |  |
| Config 3 |  | TRS.1.2 TDD |  |
| CSI-RS-Index assigned as RLM RS in PCell | | | Config 1 |  | CSI-RS.1.2 FDD | A.3.14 |
| Config 2 |  | CSI-RS.1.2 TDD |
| Config 3 |  | CSI-RS.2.2 TDD |
| T310 Timer | | | | ms | 1000 |  |
| N310 | | | |  | 2 |  |
| T1 | | | | s | 0.2 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 0.18 |  |
| T3 | | | | s | 0.14 |  |
| T4 | | | | s | 0 |  |
| T5 | | | | s | 0.17 |  |
| D1 | | | | s | 0.13 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | |

Table A.6.5.5.5.1-3: Cell specific test parameters for FR1 SCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | **Cell1** | Test 1 Cell2 | | | | |
|  | **T1 to T5** | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |
| SNR\_CSI-RS of set q0 | Config 1 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| Config 2 |  | 5 | 5 | -3 | -12 | -12 | -12 |
| Config 3 |  | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | -10 | -10 | -10 | 10 | 10 | 10 |
| Config 2 |  | -10 | -10 | -10 | 10 | 10 | 10 |
| Config 3 |  | -10 | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1 | dBm/ | -108 | -108 | -108 | -88 | -88 | -88 |
| Config 2 | SCS  kHz | -108 | -108 | -108 | -88 | -88 | -88 |
| Config 3 |  | -105 | -105 | -105 | -85 | -85 | -85 |
|  | Config 1 | dBm/ | -98 | -98 | | | | |
| Config 2 | 15kHz | -98 | -98 | | | | |
| Config 3 |  | -98 | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6. | | | | | | | | |

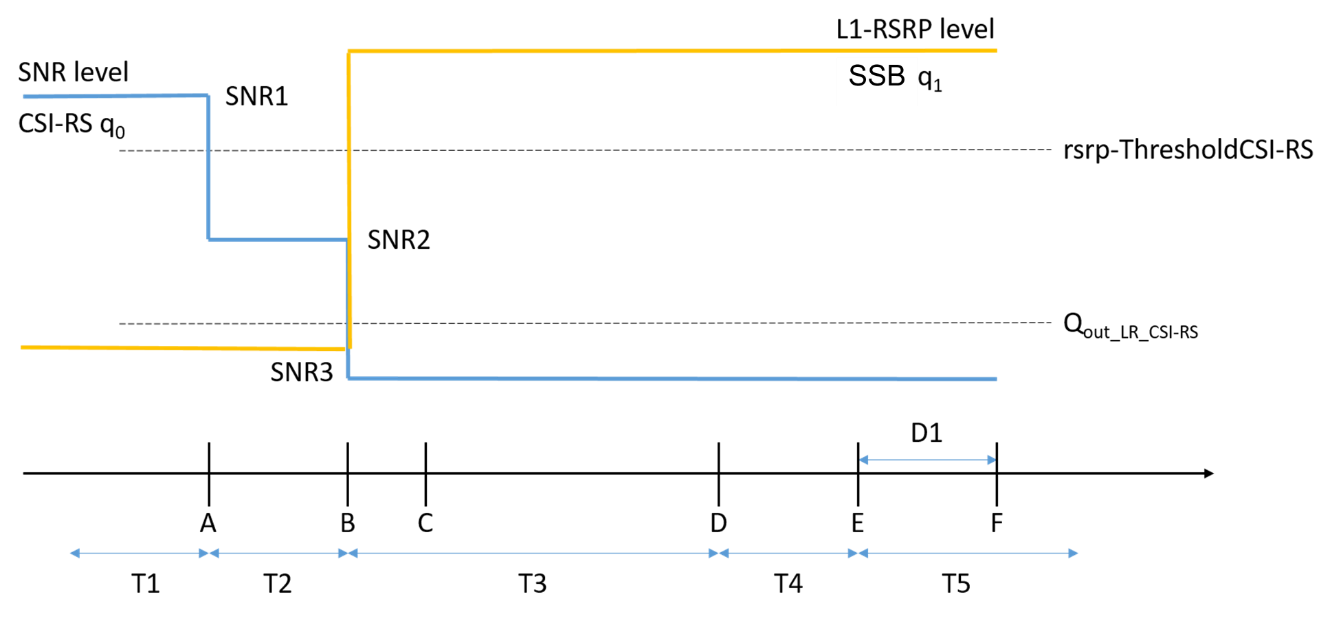


Figure A.6.5.5.5.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing in for SCell non-DRX mode

##### A.6.5.5.5.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble for UL-SCH resource application, followed by MAC-CE on the assigned uplink resources containing  a beam associated with the candidate beam set q1. The UE shall not transmit preamble earlier than time point B.

During T5, the System Simulator shall transmit a Random Access Response to UE after the System Simulator receives the preamble from UE. The UE shall transmit the msg.3 containing candidate beam set q1 for SCell BFR if UE receives the Random Access Response.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.6.5.5.6 Beam Failure Detection and Link Recovery Test for FR1 SCell configured with CSI-RS-based BFD and SSB-based LR in DRX mode

##### A.6.5.5.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP without *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.6.1-1, A.6.5.5.6.1-2, A.6.5.5.6.1-3, and A.6.5.5.6.1-4 below. There are two cells, cell 1 is the PCell and cell 2 is the SCell, in the test. UE is not provided by *schedulingRequestID-BFR-SCell-r16*, i.e., no configuration for PUCCH transmission resources, and UE shall perform the random access procedure to recover the beam failure. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.6.1-1 shows the SNR of the CSI-RS in set q0 in the active SCell to emulate beam failure. Figure A.6.5.5.6.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in SCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.6.5.5.6.1-1: Supported test configurations for FR1 PCell and SCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 2 | TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 3 | TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.6.5.5.6.1-2: General test parameters for FR1 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** | **Comment** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |  |
| RF Channel Number for PCell | | |  | 1 |  |
| Active SCell | | |  | Cell 2 |  |
| RF Channel Number for SCell | | |  | 2 |  |
| Duplex mode | Config 1 | |  | FDD |  |
| Config 2, 3 | | TDD |  |
| BW channel | Config 1 | |  | 10: NRB,c = 52 |  |
| Config 2 | | MHz | 10: NRB,c = 52 |  |
| Config 3 | |  | 40: NRB,c = 106 |  |
| TDD Configuration | Config 1 | |  | Not Applicable |  |
| Config 2 | | TDDConf.1.1 |  |
| Config 3 | | TDDConf..21 |  |
| CORESET Reference Channel | Config 1 | |  | CR.1.1 FDD | A.3.1.2 |
| Config 2 | | CR.1.1 TDD |
| Config 3 | | CR.2.1 TDD |
| SSB Configuration | Config 1 | |  | SSB.1 FR1 | A.3.10 |
| Config 2 | | SSB.1 FR1 |
| Config 3 | |  | SSB.2 FR1 |
| SMTC Configuration | Config 1, 2 | |  | SMTC.1 | A.3.11 |
| Config 3 | | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2 | | kHz | 15 |  |
| Config 3 | | 30 |  |
| PRACH Configuration | Config 1, 2 | |  | Table A.3.8.2.2-1 |  |
| Config 3 | |  | Table A.3.8.2.2-1 |  |
| csi-RS-Index assigned as beam failure detection RS in set q0 in activated SCell | | |  | 0 |  |
| OCNG parameters | | |  | OP.1 | A.3.2.1 |
| CP length | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |  |
| Beam failure detection transmission parameters | DCI format | |  | 1-0 |  |
| Number of Control OFDM symbols | |  | 2 |  |
| Aggregation level | | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | dB | 0 |  |
| DMRS precoder granularity | |  | REG bundle size |  |
| REG bundle size | |  | 6 |  |
| DRX | | |  | DRX.7 | A.3.3.7 |
| Gap pattern ID | | |  | N.A. |  |
| schedulingRequestID-BFR-SCell-r16 | | |  | absent | When the field is absent, the random access procedure will be triggered for SCell BFR |
| SSB Index assigned as CBD RS (q1) in activated SCell | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdBFR | | Config 1, 2 | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
| Config 3 | -95 |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for q0in activated SCell | Config 1 | |  | CSI-RS.1.2 FDD | A.3.14.1 |
| Config 2 | | CSI-RS.1.2 TDD |
| Config 3 | | CSI-RS.2.2 TDD |
| CSI-RS configuration for CSI reporting | Config 1 | |  | CSI-RS.1.1 FDD | A.3.14.1 |
| Config 2 | | CSI-RS.1.1 TDD |
| Config 3 | | CSI-RS.2.1 TDD |
| TRS configuration | Config 1 | |  | TRS.1.1 FDD |  |
| Config 2 | |  | TRS.1.1 TDD |  |
| Config 3 | |  | TRS.1.2 TDD |  |
| CSI-RS-Index assigned as RLM RS in PCell | Config 1 | |  | CSI-RS.1.2 FDD |  |
| Config 2 | | CSI-RS.1.2 TDD |
| Config 3 | | CSI-RS.2.2 TDD |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 8.37 |  |
| T3 | | | s | 6.44 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 1.97 |  |
| D1 | | | s | 1.93 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.6.5.5.6.1-3: Cell specific test parameters for FR1 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | **Cell 1** | Test 1 Cell2 | | | | |
|  | **T1 to T5** | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |
| SNR\_CSI-RS of set q0 | Config 1 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| Config 2 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| Config 3 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | -10 | -10 | -10 | 10 | 10 | 10 |
| Config 2 | dB | -10 | -10 | -10 | 10 | 10 | 10 |
| Config 3 | dB | -10 | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1 | dBm/ | -110 | -110 | -110 | -88 | -88 | -88 |
| Config 2 | SCS kHz | -110 | -110 | -110 | -88 | -88 | -88 |
| Config 3 |  | -107 | -107 | -107 | -85 | -85 | -85 |
|  | Config 1 | dBm/15 | -98 | -98 | | | | |
| Config 2 | kHz | -98 | -98 | | | | |
| Config 3 |  | -98 | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6. | | | | | | | | |

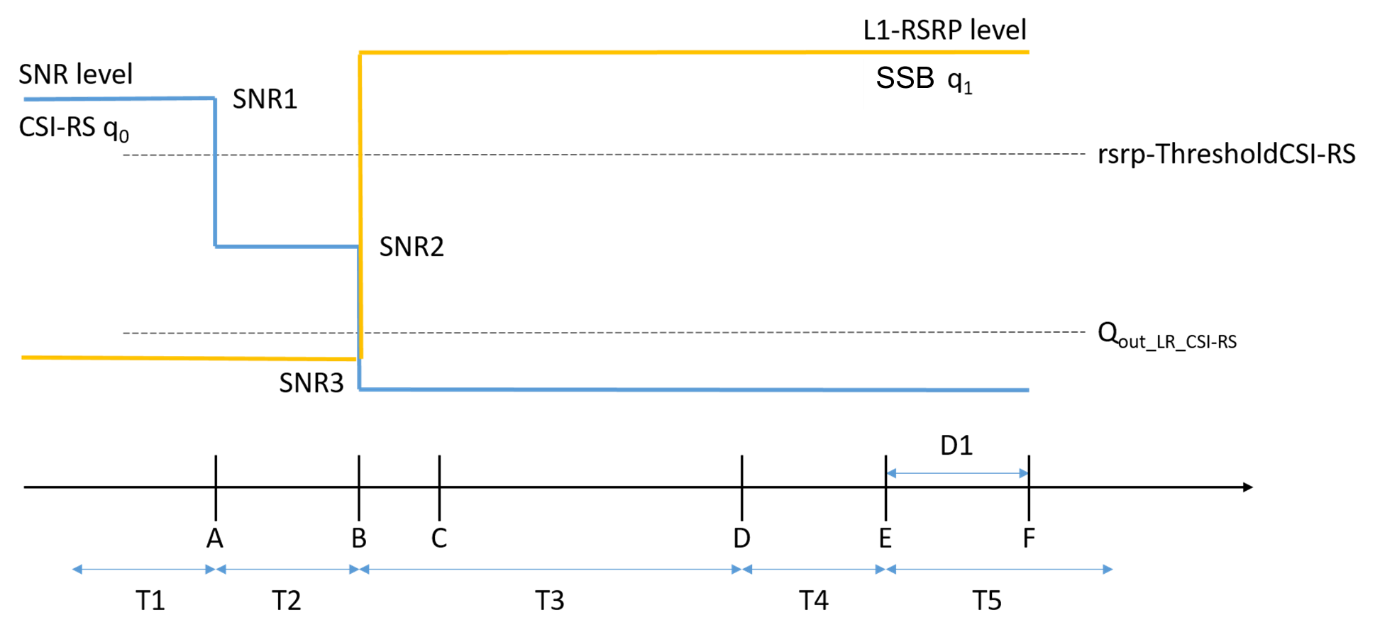


Figure A.6.5.5.6.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in DRX mode

##### A.6.5.5.6.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble for UL-SCH resource application, followed by MAC-CE on the assigned uplink resources containing  a beam associated with the candidate beam set q1. The UE shall not transmit preamble earlier than time point B.

During T5, the System Simulator shall transmit a Random Access Response to UE after the System Simulator receives the preamble from UE. The UE shall transmit the msg.3 containing candidate beam set q1 for SCell BFR if UE receives the Random Access Response.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

**< End of change 29>**

**< Start of change 30 (from - R4-2210980) >**

### A.6.5.7 DL interruptions at switching between two uplink carriers

#### A.6.5.7.1 DL interruptions at switching between two uplink carriers in FDD-TDD CA

##### A.6.5.7.1.1 Test Purpose and Environment

The purpose of this test is to verify DL interruption requirements during UE dynamic switching between two uplink carriers defined in clause 8.2.2.2.10. The test case is applicable for an uplink band pair of an inter-band FDD-TDD CA configuration when the capability *uplinkTxSwitchingPeriod* is present.

There are two cells: FR1 FDD PCell (Cell 1), FR1 TDD SCell (Cell 2). The test parameters for the two cells are given in Table A.6.5.7.1.1-1, Table A.6.5.7.1.1-2 and Table A.6.5.7.1.1-3 below.

For NR FDD carrier (Cell 1), aperiodic CSI-RS for L1-RSRP reporting is triggered with power boosting 6dB on the following symbol in the slot overlapping with the special slot of the NR TDD carrier (Cell 2):

* symbol#12 if UE does not report *uplinkTxSwitching-DL-Interruption-r16;*
* otherwise,
  + symbol #8 if UE capability *uplinkTxSwitchingPeriod* is 210us or
  + symbol #9 if UE capability *uplinkTxSwitchingPeriod* is 140us or
  + symbol #10 if UE capability *uplinkTxSwitchingPeriod* is 35us.

For NR TDD carrier (Cell 2), aperiodic CSI-RS for L1-RSRP reporting is configured with power boosting 6dB on the following symbol in the special slot:

* symbol#10 if UE does not report *uplinkTxSwitching-DL-Interruption-r16;*
* otherwise,
  + symbol #4 if UE capability *uplinkTxSwitchingPeriod* is 210us or
  + symbol #5 if UE capability *uplinkTxSwitchingPeriod* is 140us or
  + symbol #8 if UE capability *uplinkTxSwitchingPeriod* is 35us.

This test verifies that the UE correctly report the L1-RSRP reporting. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, *uplinkTxSwitching* is indicated to UE.

Table A.6.5.7.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR Cell 1: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR Cell 2: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.6.5.7.1.1-2: General test parameters for DL interruptions at switching between two uplink carriers in FDD-TDD CA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| RF Channel Number |  | Config 1 | 1, 2 | Two radio channels are used for this test. |
| Active cell |  | Config 1 | Cell 1: FR1 PCell  Cell 2: FR1 SCell | FR1 PCell on RF channel number 1  FR1 SCell on RF channel number 2 |
| CP length |  | Config 1 | Normal |  |
| DRX |  | Config 1 | OFF |  |
| Measurement gap pattern Id |  | Config 1 | OFF |  |
| Filter coefficient |  | Config 1 | 0 | L3 filtering is not used |
| CSI-RS configuration for L1-RSRP reporting |  | Config 1 | Cell 1: CSI-RS.1.5 FDD  Cell 2: CSI-RS.2.5 TDD |  |
| T1 | s | Config 1 | 5 |  |

Table A.6.5.7.1.1-3: Cell specific test parameters for DL interruptions at switching between two uplink carriers in FDD-TDD CA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell1 | Cell2 |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1 |  | FDD | TDD |
| TDD configuration | Config 1 |  | N/A | TDDConf.2.1 except that:  S=’11DL: 1GP:2UL’;  *nrofDownlinkSymbols: 11*  *nrofUplinkSymbols: 2* |
| BWchannel | Config 1 |  | 10 MHz: NRB,c = 52 | 40 MHz: NRB,c = 106 |
| Initial BWP Configuration | Config 1 |  | DLBWP.0.1 | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 | DLBWP.1.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 | ULBWP.1.1 |
| SRS configuration | Config 1 |  | SRS configuration in Table A.4.4.1.1.1-3 is applied except that:  resourceMappingstartPosition: 0resourceMappingnrofSymbols: n2 | SRS configuration in Table A.4.4.1.1.1-3 is applied except that:  resourceMappingstartPosition: 0  resourceMappingnrofSymbols: n2 |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | SR.2.1 TDD |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | CR.2.1 TDD |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | CCR.2.1 TDD |
| OCNG Patterns | |  | OP.1 | OP.1 |
| SMTC Configuration | |  | SMTC.1 | SMTC.1 |
| SSB Configuration | Config 1 |  | SSB.1 FR1 | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 2x2 Low |
| 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) | |  |  |  |
| NocNote 2 | | dBm/15 kHz | -104 | -104 |
| SS-RSRP Note 3 | | dBm/SSB SCS | -87 | -84 |
| CSI-RS RSRP Note6 | | dBm/SCS | -81 | -78 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| NocNote 2 | Config 1 | dBm/SCS | -104 | -101 |
| IoNote3 on symbols without CSI-RS | Config 1 | dBm/9.36 MHz | -58.96 | - |
|  |  | dBm/  38.16MHz | - | -52.86 |
| IoNote6 on symbols with CSI-RS | Config 1 | dBm/9.36 MHz | -56.58 | - |
|  |  | dBm/  38.16MHz | - | -50.5 |
| Time offset to Cell1 Note 5 | | μs | - | 0 |
| Propagation Condition | |  | AWGN | 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 Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

##### A.6.5.7.1.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.2.2.2.10.

UE shall send L1-RSRP report while meeting the accuracy requirements defined in clause 10.1.19.2.

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

#### A.6.5.7.2 DL interruptions at switching between two uplink carriers in TDD-TDD CA

##### A.6.5.7.2.1 Test Purpose and Environment

The purpose of this test is to verify DL interruption requirements during UE dynamic switching between two uplink carriers defined in clause 8.2.2.2.10. The test case is applicable for an uplink band pair of an inter-band TDD-TDD CA configuration when the capability *uplinkTxSwitchingPeriod* is present.

There are two cells: FR1 TDD PCell (Cell 1), FR1 TDD SCell (Cell 2). The test parameters for the two cells are given in Table A.6.5.7.2.1-1, Table A.6.5.7.2.1-2 and Table A.6.5.7.2.1-3 below.

For NR TDD PCell (Cell 1), aperiodic CSI-RS for L1-RSRP reporting is triggered with power boosting 6dB on the following symbol in the special slot:

* symbol#10 if UE does not report *uplinkTxSwitching-DL-Interruption-r16;*
* otherwise,
  + symbol #4 if UE capability *uplinkTxSwitchingPeriod* is 210us or
  + symbol #5 if UE capability *uplinkTxSwitchingPeriod* is 140us or
  + symbol #8 if UE capability *uplinkTxSwitchingPeriod* is 35us.

For NR TDD SCell (Cell 2), aperiodic CSI-RS for L1-RSRP reporting is configured with power boosting 6dB on the following symbol on the 2nd special slot of every 8 slots:

* symbol#10 if UE does not report *uplinkTxSwitching-DL-Interruption-r16;*
* otherwise,
  + symbol #4 if UE capability *uplinkTxSwitchingPeriod* is 210us or
  + symbol #5 if UE capability *uplinkTxSwitchingPeriod* is 140us or
  + symbol #8 if UE capability *uplinkTxSwitchingPeriod* is 35us.

This test verifies that the UE correctly report the L1-RSRP reporting. The test case is only applicable to UE which supports *simultaneousRxTxInterBandCA.*

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, *uplinkTxSwitching* is indicated to UE.

Table A.6.5.7.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR Cell 1: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR Cell 2: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.6.5.7.2.1-2: General test parameters for DL interruptions at switching between two uplink carriers in TDD-TDD CA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| RF Channel Number |  | Config 1 | 1, 2 | Two radio channels are used for this test. |
| Active cell |  | Config 1 | Cell 1: FR1 PCell  Cell 2: FR1 SCell | FR1 PCell on RF channel number 1  FR1 SCell on RF channel number 2 |
| CP length |  | Config 1 | Normal |  |
| DRX |  | Config 1 | OFF |  |
| Measurement gap pattern Id |  | Config 1 | OFF |  |
| Filter coefficient |  | Config 1 | 0 | L3 filtering is not used |
| CSI-RS configuration for L1-RSRP reporting |  | Config 1 | Cell 1: CSI-RS.2.5 TDD  Cell 2: CSI-RS.2.5 TDD |  |
| T1 | s | Config 1 | 5 |  |

Table A.6.5.7.2.1-3: Cell specific test parameters for DL interruptions at switching between two uplink carriers in TDD-TDD CA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell1 | Cell2 |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1 |  | TDD | TDD |
| TDD configuration | Config 1 |  | TDDConf.2.1 except that  S=’1 1DL: :2UL’;  *nrofDownlinkSymbols: 11*  *nrofUplinkSymbols: 2* | TDDConf.2.2 |
| BWchannel | Config 1 |  | 40 MHz: NRB,c = 106 | 40 MHz: NRB,c = 106 |
| Initial BWP Configuration | Config 1 |  | DLBWP.0.1 | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 | DLBWP.1.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 | ULBWP.1.1 |
| SRS configuration | Config 1 |  | SRS configuration in Table A.4.4.1.1.1-3 is applied except that:  resourceMappingstartPosition: 0  resourceMappingnrofSymbols: n2 | SRS configuration in Table A.4.4.1.1.1-3 is applied except that:  resourceMappingstartPosition: 0  resourceMappingnrofSymbols: n2 |
| PDSCH Reference measurement channel | Config 1 |  | SR.2.1 TDD | SR.2.1 TDD |
| RMSI CORESET parameters | Config 1 |  | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET parameters | Config 1 |  | CCR.2.1 TDD | CCR.2.1 TDD |
| OCNG Patterns | |  | OP.1 | OP.1 |
| SMTC Configuration | |  | SMTC.1 | SMTC.1 |
| SSB Configuration | Config 1 |  | SSB.2 FR1 | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 2x2 Low |
| 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) | |  |  |  |
| NocNote 2 | | dBm/15 kHz | -104 | -104 |
| SS-RSRP Note 3 | | dBm/SSB SCS | -84 | -84 |
| CSI-RS RSRP Note6 | | dBm/SCS | -78 | -78 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| NocNote 2 | Config 1 | dBm/SCS | -101 | -101 |
| IoNote3 on symbols without CSI-RS | Config 1 | dBm/  38.16MHz | -52.86 | -52.86 |
| IoNote6 on symbols with CSI-RS | Config 1 | dBm/  38.16MHz | -50.5 | -50.5 |
| Time offset to Cell1 Note 5 | | μs | - | 0 |
| Propagation Condition | |  | AWGN | 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 Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

##### A.6.5.7.2.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.2.2.2.10.

UE shall send L1-RSRP report while meeting the accuracy requirements defined in clause 10.1.19.2.

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

**< End of change 30>**

**< Start of change 31 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.6.6.1.1.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TN/A | | TN/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  |  | 2 | SR.1.1 TDD | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  |  | 2 | CR.1.1 TDD | | N/A | |
|  |  | 3 | CR.2.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
|  |  | 2 | CCR.1.1 TDD | | N/A | |
|  |  | 3 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | N/A | |
|  |  | 2 | TRS.1.1 TDD | | N/A | |
|  |  | 3 | TRS.1.2 TDD | | N/A | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  |  | 2 |  | | | |
|  |  | 3 |  | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
|  |  | 2 | -94 | -94 | -Infinity | -94 |
|  |  | 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | --58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 31>**

**< Start of change 32 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.6.6.1.2.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TN/A | | TN/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  |  | 2 | SR.1.1 TDD | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  |  | 2 | CR.1.1 TDD | | N/A | |
|  |  | 3 | CR.2.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
|  |  | 2 | CCR.1.1 TDD | | N/A | |
|  |  | 3 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | N/A | |
| 2 | TRS.1.1 TDD | | N/A | |
| 3 | TRS.1.2 TDD | | N/A | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  |  | 2 |  | | | |
|  |  | 3 |  | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
|  |  | 2 | -94 | -94 | -Infinity | -94 |
|  |  | 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | --58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 32>**

**< Start of change 33 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.6.6.1.3.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TN/A | | TN/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  |  | 2 | SR.1.1 TDD | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  |  | 2 | CR.1.1 TDD | | N/A | |
|  |  | 3 | CR.2.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.2 FDD | | N/A | |
|  |  | 2 | CCR.1.2 TDD | | N/A | |
|  |  | 3 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | N/A | |
|  |  | 2 | TRS.1.1 TDD | | N/A | |
|  |  | 3 | TRS.1.2 TDD | | N/A | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  |  | 2 |  | | | |
|  |  | 3 |  | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
|  |  | 2 | -94 | -94 | -Infinity | -94 |
|  |  | 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | --58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 33>**

**< Start of change 34 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.6.6.1.4.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TN/A | | TN/A | |
|  |  | 2 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
|  |  | 2 | SR.1.1 TDD | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
|  |  | 2 | CR.1.1 TDD | | N/A | |
|  |  | 3 | CR.2.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.2 FDD | | N/A | |
|  |  | 2 | CCR.1.2 TDD | | N/A | |
|  |  | 3 | CCR.2.1 TDD | | N/A | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | N/A | |
|  |  | 2 | TRS.1.1 TDD | | N/A | |
|  |  | 3 | TRS.1.2 TDD | | N/A | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
|  |  | 2 | -98 | | | |
|  |  | 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  |  | 2 |  | | | |
|  |  | 3 |  | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
|  |  | 2 |  |  |  |  |
|  |  | 3 |  |  |  |  |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
|  |  | 2 | -94 | -94 | -Infinity | -94 |
|  |  | 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | --58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | |
| Note 1: Table A.6.6.1.4.2-1The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Table A.6.6.1.4.2-1Interference 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: Table A.6.6.1.4.2-1SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 34>**

**< Start of change 35 (from - R4-2209610) >**

**< Unchanged sections omitted >**

**Table A.6.6.1.5.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | N/A | |
| IInitial BWP configuration |  | 1 | DLBWP.0,1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 35>**

**< Start of change 36 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.6.6.1.6.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | N/A | | N/A | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.2 FDD | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | N/A | |
| IInitial BWP configuration |  | 1 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | CSI-RS | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

**< End of change 36>**

**< Start of change 37 (from - R4-2210091) >**

#### A.7.3.1.4 Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2

##### A.7.3.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR2 Inter-band inter-frequency synchronous DAPS handover requirements specified in clause 6.1.3.4.

##### A.7.3.1.4.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.4.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.4.2-2, A.7.3.1.4.2-3 and A.7.3.1.4.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. The UE shall be configured with periodic CSI reporting for cell1. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the test system receives the ACK of the PDSCH corresponding to the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the test system receives the ACK of the PDSCH corresponding to the last TTI containing the RRC message implying source cell release sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop sending CSI report to the source cell.

Table A.7.3.1.4.2-1: Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.4.2-2: General test parameters for Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Threshold | | dBm | -120 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | | μs | 33 | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | <5 |  |
| T3 | | s | <0.5 |  |
| T4 | | ms | 10+Tinterrupt2 | Tinterrupt2 as defined in Table 6.1.3.4.2-2 for synchronous DAPS HO |
| T5 | | ms | 100 |  |

Table A.7.3.1.4.2-3: Cell specific test parameters for Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 (Cell 1 in FR1)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number | | |  | 1 | | | | |
| Duplex mode | | Config 1 |  | FDD | | | | |
|  | | Config 2,3 |  | TDD | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | | |
|  | | Config 3 |  | SR2.1 TDD | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | | |
|  | | Config 3 |  | CR2.1 TDD | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.1.1 FDD | | | | |
| Config 2 | CSI-RS.1.1 TDD | | | | |
| Config 3 | CSI-RS.2.1 TDD | | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | | |
|  | | Config 3 |  | SSB.2 FR1 | | | | |
| SMTC Configuration | | Config 1,2 |  | SMTC.1 | | | | |
|  | | Config 3 |  | SMTC.2 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | |
| Config 3 | 30 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | |
| Config 3 | 30 kHz | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 2 | | | | |
| BWP | | Initial DL BWP |  | DLBWP.0.1 | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.3 | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.3 | | | | |
| EPRE ratio of PSS to SSS | | | dB | 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 | | | dBm/15kHz | NA  Link only, see clause A.3.7A | | | | |
| Note2 | Config 1,2 | | dBm/SCS |  | | | | |
|  | Config 3 | |  |  | | | | |
|  | | | dB |  | | | | |
|  | | | dB |  | | | | |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz |  | | | | |
|  | Config 3 | | dBm/  38.16MHz |  | | | | |
| Propagation condition | | | - | AWGN | | | | |
| Note 1: OCNG shall be used such that the cell is 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

Table A.7.3.1.4.2-4: Cell specific test parameters for Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 (Cell 2 in FR2)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| Assumption for UE beamsNote 6 | |  | Rough | | | | |
| AoA setup | |  | Setup 1 as defined in A.3.15 | | | | |
| NR RF Channel Number | |  | 2 | | | | |
| Duplex mode | Config 1,2,3 |  | TDD | | | | |
| TDD configuration | Config 1,2,3 |  | TDDConf.3.1 | | | | |
| BWchannel | Config 1,2,3 | MHz | 100: NRB,c = 66 | | | | |
| BWP BW | Config 1,2,3 | MHz | 100: NRB,c = 66 | | | | |
| TRS configuration | Config 1,2,3 |  | TRS.2.1 TDD | | | | |
| DRX Cycle | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | Config 1,2,3 |  | SR3.1 TDD | | | | |
| CORESET Reference Channel | Config 1,2,3 |  | CR3.1 TDD | | | | |
| OCNG Patterns | |  | OCNG pattern 1 | | | | |
| CSI-RS configuration for CSI reporting | Config 1,2,3 |  | CSI-RS.3.1 TDD | | | | |
| SSB Configuration | Config 1,2,3 |  | SSB.1 FR2 | | | | |
| SMTC Configuration | |  | SMTC.1 | | | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,3 | kHz | 120 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | Config 1,2,3 | kHz | 120 kHz | | | | |
| PRACH configuration | |  | FR2 PRACH configuration 2 | | | | |
| TCI configuration | |  | CSI-RS.Config.0 | | | | |
| BWP | Initial DL BWP |  | DLBWP.0.1 | | | | |
|  | Dedicated DL BWP |  | DLBWP.1.3 | | | | |
|  | Initial UL BWP |  | ULBWP.0.1 | | | | |
|  | Dedicated UL BWP |  | ULBWP.1.3 | | | | |
| EPRE ratio of PSS to SSS | | dB | 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 | | dBm/15kHz | -104.7 | -104.7 | -104.7 | -104.7 | -104.7 |
| Note2 | | dBm/SCS | -95.7 | -95.7 | -95.7 | -95.7 | -95.7 |
|  | | dB | -Infinity | 10 | 10 | 10 | 10 |
|  | | dB | -Infinity | 10 | 10 | 10 | 10 |
| IoNote3 | | dBm/  9.36MHz | -66.7 | -55.4 | -55.4 | -55.4 | -55.4 |
| Propagation condition | | - | AWGN | | | | |
| Note 1: OCNG shall be used such that the cell is 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  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.7.3.1.4.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 92 ms from the beginning of time period T3. During Dhandover1, the interruption on Cell 1 shall not exceed Tinterrupt1 as defined in Table 6.1.3.4.2-1 for synchronous DAPS HO.

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

NOTE: The handover delay Dhandover1 can be expressed as: TRRC\_procedure + TIU + Tprocessing + T∆ + Tmargin, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

TIU = 20 ms in the test. TIU is defined in clause 6.1.1.2.2.

T∆ = 20 ms in the test. T∆ is defined in clause 6.1.1.2.2.

Tprocessing = 40 ms in the test. Tprocessing is defined in clause 6.1.1.2.2.

Tmargin = 2 ms in the test. Tmargin is defined in clause 6.1.1.2.2.

This gives a total of 92 ms.

The UE shall complete to release Cell 1 less than (10 ms + Tinterrupt2) from the beginning of time period T4. During Dhandover2, the interruptionon Cell 2 shall not exceed Tinterrupt2 as defined in Table 6.1.3.4.2-2 for synchronous DAPS HO.

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

NOTE: The handover delay Dhandover2 can be expressed as: TRRC\_procedure + Tinterrupt2, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

#### A.7.3.1.5 Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2

##### A.7.3.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR2 Inter-band inter-frequency asynchronous DAPS handover requirements specified in clause 6.1.3.4.

##### A.7.3.1.5.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.5.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.5.2-2, A.7.3.1.5.2-3 and A.7.3.1.5.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. The UE shall be configured with periodic CSI reporting for cell1. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the test system receives the ACK of the PDSCH corresponding to the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the the test system receives the ACK of the PDSCH corresponding to last TTI containing the RRC message implying source cell release sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop sending CSI report to the source cell.

Table A.7.3.1.5.2-1: Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.5.2-2: General test parameters for Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Threshold | | dBm | -120 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | | μs | 62.5 | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | <5 |  |
| T3 | | s | <0.5 |  |
| T4 | | ms | 10+Tinterrupt2 | Tinterrupt2 as defined in Table 6.1.3.4.2-2 for asynchronous DAPS HO. |
| T5 | | ms | 100 |  |

Table A.7.3.1.5.2-3: Cell specific test parameters for Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 (Cell 1 in FR1)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number | | |  | 1 | | | | |
| Duplex mode | | Config 1 |  | FDD | | | | |
|  | | Config 2,3 |  | TDD | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | | |
|  | | Config 3 |  | SR2.1 TDD | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | | |
|  | | Config 3 |  | CR2.1 TDD | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.1.1 FDD | | | | |
| Config 2 | CSI-RS.1.1 TDD | | | | |
| Config 3 | CSI-RS.2.1 TDD | | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | | |
|  | | Config 3 |  | SSB.2 FR1 | | | | |
| SMTC Configuration | | Config 1,2 |  | SMTC.1 | | | | |
|  | | Config 3 |  | SMTC.2 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | |
|  | | Config 3 |  | 30 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | |
|  | | Config 3 |  | 30 kHz | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 2 | | | | |
| BWP | | Initial DL BWP |  | DLBWP.0.1 | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.3 | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.3 | | | | |
| EPRE ratio of PSS to SSS | | | dB | 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 | | | dBm/15kHz | NA  Link only, see clause A.3.7A | | | | |
| Note2 | Config 1,2 | | dBm/SCS |  | | | | |
|  | Config 3 | |  |  | | | | |
|  | | | dB |  | | | | |
|  | | | dB |  | | | | |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz |  | | | | |
|  | Config 3 | | dBm/  38.16MHz |  | | | | |
| Propagation condition | | | - | AWGN | | | | |
| Note 1: OCNG shall be used such that the cell is 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

Table A.7.3.1.5.2-4: Cell specific test parameters for Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 (Cell 2 in FR2)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| Assumption for UE beamsNote 6 | |  | Rough | | | | |
| AoA setup | |  | Setup 1 as defined in A.3.15 | | | | |
| NR RF Channel Number | |  | 2 | | | | |
| Duplex mode | Config 1,2,3 |  | TDD | | | | |
| TDD configuration | Config 1,2,3 |  | TDDConf.3.1 | | | | |
| BWchannel | Config 1,2,3 | MHz | 100: NRB,c = 66 | | | | |
| BWP BW | Config 1,2,3 | MHz | 100: NRB,c = 66 | | | | |
| TRS configuration | Config 1,2,3 |  | TRS.2.1 TDD | | | | |
| DRX Cycle | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | Config 1,2,3 |  | SR3.1 TDD | | | | |
| CORESET Reference Channel | Config 1,2,3 |  | CR3.1 TDD | | | | |
| OCNG Patterns | |  | OCNG pattern 1 | | | | |
| CSI-RS configuration for CSI reporting | Config 1,2,3 |  | CSI-RS.3.1 TDD | | | | |
| SSB Configuration | Config 1,2,3 |  | SSB.1 FR2 | | | | |
| SMTC Configuration | |  | SMTC.1 | | | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,3 | kHz | 120 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | Config 1,2,3 | kHz | 120 kHz | | | | |
| PRACH configuration | |  | FR2 PRACH configuration 2 | | | | |
| TCI configuration | |  | CSI-RS.Config.0 | | | | |
| BWP | Initial DL BWP |  | DLBWP.0.1 | | | | |
|  | Dedicated DL BWP |  | DLBWP.1.3 | | | | |
|  | Initial UL BWP |  | ULBWP.0.1 | | | | |
|  | Dedicated UL BWP |  | ULBWP.1.3 | | | | |
| EPRE ratio of PSS to SSS | | dB | 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 | | dBm/15kHz | -104.7 | -104.7 | -104.7 | -104.7 | -104.7 |
| Note2 | | dBm/SCS | -95.7 | -95.7 | -95.7 | -95.7 | -95.7 |
|  | | dB | -Infinity | 10 | 10 | 10 | 10 |
|  | | dB | -Infinity | 10 | 10 | 10 | 10 |
| IoNote3 | | dBm/  9.36MHz | -66.7 | -55.4 | -55.4 | -55.4 | -55.4 |
| Propagation condition | | - | AWGN | | | | |
| Note 1: OCNG shall be used such that the cell is 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.  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.7.3.1.5.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 92 ms from the beginning of time period T3. During Dhandover1, the interruption on Cell 1 shall not exceed Tinterrupt1 as defined in Table 6.1.3.4.2-1 for asynchronous DAPS HO.

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

NOTE: The handover delay Dhandover1 can be expressed as: TRRC\_procedure + TIU + Tprocessing + T∆ + Tmargin, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

TIU = 20 ms in the test. TIU is defined in clause 6.1.1.2.2.

T∆ = 20 ms in the test. T∆ is defined in clause 6.1.1.2.2.

Tprocessing = 40 ms in the test. Tprocessing is defined in clause 6.1.1.2.2.

Tmargin = 2 ms in the test. Tmargin is defined in clause 6.1.1.2.2.

This gives a total of 792 ms.

The UE shall complete to release Cell 1 less than (10 ms + Tinterrupt2) from the beginning of time period T4. During Dhandover2, the interruptionon Cell 2 shall not exceed Tinterrupt2 as defined in Table 6.1.3.4.2-2 for asynchronous DAPS HO.

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

NOTE: The handover delay Dhandover2 can be expressed as: TRRC\_procedure + Tinterrupt2, where:

TRRC\_procedure = 10 ms and is specified in clause 12 in TS 38.331 [2].

**< End of change 37>**

**< Start of change 38 (from - R4-2210979) >**

#### A.7.5.5.6 Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-RS-based BFD and LR in non-DRX mode

##### A.7.5.5.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for an active SCell and that the UE performs correct CSI-RS-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell with *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 SCell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.6.1-1, A.7.5.5.6.1-2 and A.7.5.5.6.1-3. There are two cells, cell 1 is the active PCell and cell 2 is the active SCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.6.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active SCell to emulate CSI-RS based beam failure. Figure A.7.5.5.6.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.7.5.5.6.1-1: Supported test configurations for FR2 PCell and SCell

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

Table A.7.5.5.6.1-2: General test parameters for FR2 SCell for beam failure detection and link recovery testing in non-DRX mode



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1 |  | Cell 1 |  |
| RF Channel Number for PCell | | 1 |  | 1 |  |
| Active SCell | | 1 |  | Cell 2 |  |
| RF Channel Number for SCell | | 1 |  | 2 |  |
| Duplex mode | | 1 |  | TDD |  |
| TDD Configuration | | 1 |  | TDDConf.3.1 |  |
| BWchannel | | 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| DL initial BWP configuration | | 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD | A.3.1.2 |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1 |  | OP.1 | A.3.2.1 |
| CP length | | 1 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.3 FR2 | A.3.10 |
| SMTC Configuration | | 1 |  | SMTC.3 | A.3.11 |
| PRACH Configuration | | 1 |  | FR2 PRACH configuration 4 | Table A.3.8.3.4-1 |
| DRX configuration | | 1 |  | OFF |  |
| CSI-RS configuration for BFD/CBD on SCell | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1 |  | 1 |  |
| CSI-RS configuration for RLM on PCell | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| Beam failure detection transmission parameters | DCI format | 1 |  | 1-0 |  |
| Number of Control OFDM symbols | 1 |  | 2 |  |
| Aggregation level | 1 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1 | dB | 0 |  |
| DMRS precoder granularity | 1 |  | REG bundle size |  |
| REG bundle size | 1 |  | 6 |  |
| Gap pattern ID | | 1 |  | N/A |  |
| schedulingRequestID-BFR-SCell-r16 | | 1 |  | Configured |  |
| Periodicity of PUCCH for SR configuration for BFR on SCell | | 1 | slot | 40 | 5ms |
| Offset of PUCCH for SR configuration for BFR on SCell | | 1 | slot | 4 |  |
| PUCCH parameters for SR configuration for BFR on SCell | | 1 |  | Table 8.3.3.1.2-1 in [13] |  |
| rlmInSyncOutOfSyncThreshold | | 1 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1 |  | periodic |  |
| reportQuantity | | 1 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1 | slot | 40 |  |
| CSI reporting offset | | 1 | slot | 4 |  |
| T310 | | 1 | ms | 1000 |  |
| N310 | | 1 |  | 2 |  |
| T1 | | 1 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1 | s | 1.17 |  |
| T3 | | 1 | s | 0.9 |  |
| T4 | | 1 | s | 0 |  |
| T5 | | 1 | s | 0.31 |  |
| D1 | | 1 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.7.5.5.6.1-3: Cell specific test parameters for FR2 SCell for beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell2  Test 1 | | | | |
|  | T1 to T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | Setup 1 defined in A.3.15 | | | | |
| Assumptpion for UE beams Note 10 | |  | Rough | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |
| SNR\_CSI-RS of set q0 | Config 1 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS  kHz | -104.5 | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| Noc | Config 1 | dBm/  120kHz | -104.7 | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | | |



Figure A.7.5.5.6.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in non-DRX mode

##### A.7.5.5.6.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 in A.7.5.5.6.1 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initial link recovery. During T4 and T5 the UE measures and evaluates beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q1. The UE shall not transmit PUCCH with an LRR with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.7.5.5.7 Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-RS-based BFD and LR in DRX mode

##### A.7.5.5.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for an active SCell and that the UE performs correct CSI-RS-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell with *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 SCell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.7.1-1, A.7.5.5.7.1-2 and A.7.5.5.7.1-3. There are two cell, cell 1 is the active PCell and cell 2 is the active SCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.7.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active SCell to emulate CSI-RS based beam failure. Figure A.7.5.5.7.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.7.5.5.7.1-1: Supported test configurations for FR2 PCell and SCell

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

Table A.7.5.5.7.1-2: General test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test**  **Config.** | **Unit** | **Value** | **Comment** |
|  | |  |  | **Test 1** |  |
| Active PCell | | 1 |  | Cell 1 |  |
| RF Channel Number for PCell | | 1 |  | 1 |  |
| Active SCell | | 1 |  | Cell 2 |  |
| RF Channel Number for SCell | | 1 |  | 2 |  |
| Duplex mode | | 1 |  | TDD |  |
| TDD Configuration | | 1 |  | TDDConf.3.1 |  |
| BWchannel | | 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | | 1 |  | 66 |  |
| PDSCH/PDCCH subcarrier spacing | | 1 | kHz | 120 |  |
| DL initial BWP configuration | | 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | 1 |  | ULBWP.1.1 |  |
| PDSCH Reference Channel | | 1 |  | SR.3.2 TDD |  |
| RMSI CORESET Reference Channel | | 1 |  | CR.3.1 TDD | A.3.1.2 |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.3.1 TDD |  |
| OCNG parameters | | 1 |  | OP.1 | A.3.2.1 |
| CP length | | 1 |  | Normal |  |
| PDSCH/PDCCH TCI state | | 1 |  | TCI.State.0 |  |
| CSI-RS for tracking | | 1 |  | TRS.2.1 TDD |  |
| SSB Configuration | | 1 |  | SSB.3 FR2 | A.3.10 |
| SMTC Configuration | | 1 |  | SMTC.3 | A.3.11 |
| PRACH Configuration | | 1 |  | FR2 PRACH configuration 4 | Table A.3.8.3.4-1 |
| DRX configuration | | 1 |  | DRX.3 | A.3.3.3 |
| CSI-RS configuration for BFD/CBD on SCell | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS index assigned as BFD RS (q0) | | 1 |  | 0 |  |
| CSI-RS index assigned as CBD RS (q1) | | 1 |  | 1 |  |
| CSI-RS configuration for RLM on PCell | | 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| Beam failure detection transmission parameters | DCI format | 1 |  | 1-0 |  |
| Number of Control OFDM symbols | 1 |  | 2 |  |
| Aggregation level | 1 | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average SSS RE energy | 1 | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | 1 | dB | 0 |  |
| DMRS precoder granularity | 1 |  | REG bundle size |  |
| REG bundle size | 1 |  | 6 |  |
| Gap pattern ID | | 1 |  | N/A |  |
| schedulingRequestID-BFR-SCell-r16 | | 1 |  | Configured |  |
| Periodicity of PUCCH for SR configuration for BFR on SCell | | 1 | slot | 40 | 5ms |
| Offset of PUCCH for SR configuration for BFR on SCell | | 1 | slot | 4 |  |
| PUCCH parameters for SR configuration for BFR on SCell | | 1 |  | Table 8.3.3.1.2-1 in [13] |  |
| rlmInSyncOutOfSyncThreshold | | 1 |  | absent | Value 0 is applied. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | 1 | dBm/SCS | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | 1 |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | 1 |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | 1 |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| reportConfigType | | 1 |  | periodic |  |
| reportQuantity | | 1 |  | cri-RI-PMI-CQI |  |
| CSI reporting periodicity | | 1 | slot | 40 |  |
| CSI reporting offset | | 1 | slot | 4 |  |
| T310 | | 1 | ms | 1000 |  |
| N310 | | 1 |  | 2 |  |
| T1 | | 1 | s | 1 | The UE shall be fully synchronized to cell 1 during T1 |
| T2 | | 1 | s | 5.43 |  |
| T3 | | 1 | s | 5.16 |  |
| T4 | | 1 | s | 0 |  |
| T5 | | 1 | s | 0.31 |  |
| D1 | | 1 | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.7.5.5.7.1-3: Cell specific test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | **Cell1** | Cell2  Test 1 | | | | |
|  | **T1 to T5** | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |
| SNR\_CSI-RS of set q0 | Config 1 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/  SCS kHz | -104.5 | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
| Noc | Config 1 | dBm/120 kHz | -104.7 | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.7.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | | |



Figure A.7.5.5.7.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in DRX mode

##### A.7.5.5.7.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 in A.7.5.5.7.1 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initial link recovery. During T4 and T5 the UE measures and evaluates beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q1. The UE shall not transmit PUCCH with an LRR with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

**< End of change 38>**

**< Start of change 39 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.7.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
|  |  | 2 | 48 | | 48 | |
| Intial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
|  |  | 2 | SR.3.3 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
|  |  | 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
|  |  | 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1~2 | N/A | | 16 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.7 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.8 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

**< End of change 39>**

**< Start of change 40 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.7.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1, 2 | 66 | | 66 | |
| Intial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
|  |  | 2 | SR.3.3 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
|  |  | 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
|  |  | 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.4 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

**< End of change 40>**

**< Start of change 41 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.7.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
|  |  | 2 | 48 | | 48 | |
| Intial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | CSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
|  |  | 2 | SR.3.3 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
|  |  | 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
|  |  | 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1~2 | N/A | | 16 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.7 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.8 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

**< End of change 41>**

**< Start of change 42 (from - R4-2209610) >**

**< Unchanged sections omitted >**

Table A.7.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1, 2 | 66 | | 66 | |
| Intial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SCSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.12TDD | | N/A | |
|  |  | 2 | SR.3.3 TDD | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
|  |  | 2 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
|  |  | 2 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state |  | 1, 2 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
|  |  | 2 | SSB.4 FR2 | | SSB.4 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | AWGN | |

**< End of change 42>**

**< Start of change 43 (from R4-2210981) >**

A.7.6.6.2 L1-SINR measurement with SSB based CMR and dedicated IMR when DRX is used

A.7.6.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.2, with the testing configurations for NR cells in Table A.7.6.6.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

**Table A.7.6.6.2.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with SSB based CMR and CSI-IM based IMR**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

A.7.6.6.2.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.6.2.2-1 and Table A.7.6.6.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the SSBs and the associated CSI-IM resources, and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD measurements based on the SSBs, and UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-IM resources as IMR.

**Table A.7.6.6.2.2-1: General test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Value** |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| 2 | SSB.2 FR2 |
| CSI-IM configuration | 1~2 |  | CSI-IM.3.1 TDD |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| DRX configuration | 1~2 |  | DRX.3 |
| reportConfigType | 1~2 |  | periodic |
| reportQuantity-r16 | 1~2 |  | ssb-Index-SINR-r16 |
| Number of reported RS | 1~2 |  | 2 |
| L1-SINR reporting period | 1~2 | slot | 640 |
| T1 | 1~2 | s | 5 |
| T2 | 1~2 | s | 2 |
| Propagation condition | 1~2 |  | AWGN |
| EPRE ratio of PSS to SSS | 1~2 | dB | 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 condition | 1~2 |  | 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. | | | |

**Table A.7.6.6.2.2-2: SSB specific test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **SSB#0** | | **SSB#1** | |
| **T1** | **T2** | **T1** | **T2** |
| Angle of arrival configuration | 1~2 |  | Setup 1 according to A.3.15.1 | | | |
| Beam assumptionNote 4 | 1~2 |  | Rough | | | |
| Note2 | 1~2 | dBm/15kHz | -105 | | | |
| Note2 | 1 | dBm/SSB SCS | -96 | | | |
| 2 | -93 | | | |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -96 | -96 | -Infinity | -87 |
| 2 | -93 | -93 | -Infinity | -84 |
| Io Note3 | 1 | dBm/95.04MHz | -64 | -64 | -67 | -57.5 |
| 2 | -64 | -64 | -67 | -57.5 |
|  | 1~2 | dB | 0 | 0 | -Infinity | 9 |
| 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: SSB RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

A.7.6.6.2.3 Test Requirements

The UE shall send L1-SINR report every 640 slots. No later than X ms plus 640 slots from the beginning of time period T2, UE shall send L1-SINR report including the results for both SSB#0+CSI-IM#0 and SSB#1+CSI-IM#1 while meeting the accuracy requirements defined in clause 10.1.28.2, where X is

- 2880 for UE supporting power class 1

- 1920 for UE supporting power class 2,3 or 4.

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

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

**< End of change 43>**

**< Start of change 44 (from R4-2210981) >**

A.7.7.6.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR configured and CSI-RS resource set with repetition off

A.7.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.8.4.1 and clause 10.1.28.1 for L1-SINR measurements based on CSI-RS with the testing configurations for NR cells in Table A.7.7.6.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

**Table A.7.7.6.1.1-1: Applicable NR configurations for FR2 L1-SINR test with CSI-RS based CMR and no dedicated IMR configured**

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

A.7.7.6.1.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.6.1.2-1 and Table A.7.7.6.1.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.7.7.6.1.2-1 and Table A.7.7.6.1.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

**Table A.7.7.6.1.2-1: FR2 CSI-RS based L1-SINR general test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** |
| SSB GSCN | 1 |  | freq1 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.3  ULBWP.1.3 |
| TRS Configuration | 1 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1 |  | TCI.State.2 |
| SMTC configuration | 1 |  | SMTC.1 |
| CSI-RS | 1 |  | CSI-RS.3.2 TDD |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | cri-SINR-r16 |
| nrofReportedRS | 1 |  | 2 |
| L1-SINR reporting period | 1 |  | slot80 |
| Propagation condition | 1 |  | AWGN |
| Antenna configuration | 1 |  | 1x2 |
| EPRE ratio of PSS to SSS | 1 | dB | 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 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. | | | |

**Table A.7.7.6.1.2-2: FR2 CSI-RS based L1-SINR OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | | **Unit** | **Test 1** | |
| **CSI-RS0** | **CSI-RS1** |
| Angle of arrival configuration |  | |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 | |  |  | Rough | |
|  | 1~2 | | dBm/15kHz | -100 | |
|  | 1~2 | | dBm/SSB SCS | -91 | |
|  | 1~2 | | dB | 10 | -2 |
| CSI-RS-RSRPNote1 | 1~2 | | dBm/SCS | -81 | -93 |
| IoNote1 | 1~2 | | dBm/  95.04MHz | -51.57 | -59.86 |
|  | 1~2 | | dB | 10 | -2 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: Void.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.7.7.6.1.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clauses 10.1.28.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.7.7.6.1.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.1.2-1.

**Table A.7.7.6.1.3-1: L1-SINR absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | Test requirement Notes1,2 |
| CSI-RS0 | L1-SINR0-δ≤ Reported SINR(dB) ≤L1-SINR0+δ |
| CSI-RS1 | L1-SINR1-δ ≤ Reported SINR(dB) ≤L1-SINR1+δ |
| Note 1: L1-SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration  Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.2.1-1, selected according to the Io used in the test | |

A.7.7.6.2 L1-SINR measurement with SSB based CMR and dedicated IMR

A.7.7.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.8.4.2 and clause 10.1.28.2 for L1-SINR measurements with SSB based CMR and CSI-IM based IMR, with the testing configurations for NR cells in Table A.7.7.6.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

**Table A.7.7.6.2.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with SSB based CMR and CSI-IM based IMR**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

A.7.7.6.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.6.2.2-1 and Table A.7.7.6.2.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.7.7.6.2.2-1 and Table A.7.7.6.2.2-2.

Here is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources and one CSI-IM resource set with two CSI-IM resource. UE is configured to perform RLM and BFD measurement based on the SSB resources 0 and 1. UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-IM resources as IMR.

**Table A.7.7.6.2.2-1: FR2 L1-SINR general test parameters with SSB based CMR and CSI-IM based IMR**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| 2 | SSB.2 FR2 |
| CSI-IM configuration | 1~2 |  | CSI-IM 3.1 TDD |
| OCNG Patterns | 1~2 |  | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.3  ULBWP.1.3 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| reportConfigType | 1~2 |  | periodic |
| reportQuantity-r16 | 1~2 |  | ssb-Index-SINR-r16 |
| Number of reported RS | 1~2 |  | 2 |
| L1-SINR reporting period | 1~2 |  | slot640 |
| Propagation condition | 1~2 |  | AWGN |
| Antenna configuration | 1~2 |  | 1x2 |
| EPRE ratio of PSS to SSS | 1~2 | dB | 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 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. | | | |

**Table A.7.7.6.2.2-2: FR2 L1-SINR SSB specific test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | |
| **SSB0** | **SSB1** |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | |
|  | 1~2 | dBm/15kHz | -100 | |
|  | 1 | dBm/SSB SCS | -91 | |
| 2 | -88 | |
|  | 1~2 | dB | 10 | -2 |
| SS-RSRPNote1 | 1 | dBm/SCS | -81 | -93 |
| 2 | -78 | -90 |
| IoNote1 | 1~2 | dBm/95.04 MHz | -51.57 | -59.86 |
|  | 1~2 | dB | 10 | -2 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.7.7.6.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for SSB#0+CSI-IM#0 and SSB#1+CSI-IM#1 of Cell 1 shall fulfil the requirements in clauses 10.1.28.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB#0+CSI-IM#0 and absolute accuracy of SSB#1+CSI-IM#1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.7.7.6.2.3-1.

Relative accuracy of SSB#0+CSI-IM#0 compared with SSB#1+CSI-IM#1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.2.2-2.

**Table A.7.7.6.2.3-1: L1-SINR absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | Test requirement Notes1,2 |
| SSB#0+CSI-IM#0 | L1\_SINR0 -δ ≤ Reported SINR(dB) ≤ L1\_SINR0 +δ |
| SSB#1+CSI-IM#1 | L1\_SINR1 -δ ≤ Reported SINR(dB) ≤ L1\_SINR1 +δ |
| Note 1: L1\_SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB#n+CSI-IM#n under consideration  Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.2.1-2, selected according to the Io used in the test | |

A.7.7.6.3 L1-SINR measurement with CSI-RS based CMR and dedicated IMR

A.7.7.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will partly verify the requirements in Clauses 9.8.4.3 and clause 10.1.28.3 for L1-SINR measurements based on CSI-RS as both CMR and IMR with the testing configurations for NR cell in Table A.7.7.6.3.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

**Table A.7.7.6.3.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with CSI-RS based both CMR based IMR**

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

A.7.7.6.3.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.6.3.2-1 and Table A.7.7.6.3.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.7.7.6.3.2-1 and Table A.7.7.6.3.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured two CSI-RS resource sets with two CSI-RS resources for each set. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB. UE is configured to perform L1-SINR measurement based on the configured CSI-RS as both CMR and IMR.

**Table A.7.7.6.3.2-1: FR2 L1-SINR measurement test with CSI-RS based both CMR and IMR**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** |
| SSB GSCN | 1 |  | freq1 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.3.1 |
| BWchannel | 1 | MHz | 100: NRB,c = 66 |
| PDSCH Reference measurement channel | 1 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.3.1 TDD |
| SSB configuration | 1 |  | SSB.1 FR2 |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| TRS Configuration | 1 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1 |  | TCI.State.2 |
| SMTC configuration | 1 |  | SMTC.1 |
| CSI-RS configuration as CMR | 1 |  | CSI-RS.3.2 TDD |
| CSI-RS configuration as IMR | 1 |  | CSI-RS.3.3A TDD |
| reportConfigType | 1 |  | periodic |
| reportQuantity-r16 | 1 |  | cri-SINR-r16 |
| nrofReportedRS | 1 |  | 2 |
| L1-RSRP reporting period | 1 |  | slot80 |
| Propagation condition | 1 |  | AWGN |
| Antenna configuration | 1 |  | 1x2 |
| EPRE ratio of PSS to SSS | 1 | dB | 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 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. | | | |

**Table A.7.7.6.3.2-2: FR2 CSI-RS based L1-SINR measurement OTA related test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | |
|  |  |  | **CSI-RS0** | **CSI-RS1** |
| Angle of arrival configuration |  |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 |  |  | Rough | |
|  | 1~2 | dBm/15kHz | -100 | |
|  | 1~2 | dBm/SSB SCS | -91 | |
|  | 1~2 | dB | 10 | 0 |
| CSI-RS-RSRPNote1 | 1~2 | dBm/SCS | -81 | -91 |
| IoNote1 | 1~2 | dBm/  95.04MHz | -51.57 | -59.86 |
|  | 1~2 | dB | 10 | 0 |
| Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 3: No additional noise is added by the test system in Test 2.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

A.7.7.6.3.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for CSI-RS#0+CSI-RS#2 and CSI-RS#1+CSI-RS#3 of Cell 1 shall fulfil the requirements in clause 10.1.28.3. The following requirements are to be verified:

Absolute accuracy of CSI-RS#0 and absolute accuracy of CSI-RS#1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.7.7.6.3.3-1.

Relative accuracy of CSI-RS#0 compared with CSI-RS#1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.3.2-1.

**Table A.7.7.6.3.3-1: L1-SINR absolute accuracy test requirement**

|  |  |
| --- | --- |
|  | Test requirement Notes1,2 |
| CSI-RS#0 | L1-SINR0 -δ≤ Reported SINR(dBm) ≤L1-SINR 0 +δ |
| CSI-RS#1 | L1-SINR 1 -δ≤ Reported SINR(dBm) ≤L1-SINR 1 +δ |
| Note 1: L1-SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS#n under consideration  Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.3.1-1. | |

**< End of change 44>**

**< Start of change 45 (from - R4-2209076) >**

### A.10.3.4 Beam failure detection and link recovery procedures

A.10.3.4.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.10.3.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5A.

The test parameters are given in Tables A.10.3.4.1.1-1, A.10.3.4.1.1-2, and A.10.3.4.1.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.10.3.4.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q0 in the active PSCell to emulate SSB based beam failure. Figure A.10.3.4.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA model. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40 ms) in test 1.

**Table A.10.3.4.1.1-1: Supported test configurations for FR1 PSCell with CCA**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

**Table A.10.3.4.1.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Value** | **Comment** |
|  | | | | |  | **Test 1** |  |
| Active E-UTRA PCell | | | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | | | |  | 1 |  |
| Active PSCell | | | | |  | Cell 2 |  |
| RF Channel Number | | | | |  | 2 |  |
| DL CCA model | | | | |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | |  | As specified in A.3.26.2.2 |  |
| Duplex mode | | | | Config 1, 2 |  | TDD |  |
| BWchannel | | | | Config 1, 2 | MHz | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | | Config 1, 2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config 1, 2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1, 2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1, 2 |  | ULBWP.1.1 |  |
| TDD configuration | | | | Config 1, 2 |  | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | | | Config 1, 2 |  | CR.1.1 CCA |  |
| SSB Configuration | | | | Config 1, 2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | | | Config 1, 2 |  | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1, 2 |  | 30 KHz |  |
| PRACH Configuration | | | | Config 1, 2 |  | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low |  |
| Beam failure | | DCI format | | |  | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols | | |  | 2 |  |
|  | | Aggregation level | | | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size |  |
|  | | REG bundle size | | |  | 6 |  |
| DRX | | | | |  | OFF |  |
| Gap pattern ID | | | | |  | gp0 |  |
| gapOffset | | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2 | | | | dBm/SCS kHz | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | | Config 1, 2 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | | Config 1, 2 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | | | |  | 0,1 |  |
| T310 timer | | | | | ms | 1000 |  |
| N310 | | | | |  | 2 |  |
| T1 | | | | | s | 0.2 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | 0.93 |  |
| T3 | | | | | s | 0.52 |  |
| T4 | | | | | s | 0 |  |
| T5 | | | | | s | 0.45 |  |
| D1 | | | | | s | 0.41 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | | | | |

**Table A.10.3.4.1.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | | | |
|  | | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| DL CCA probability PCCA,DL | Note 10, 12 | |  | 1.0 | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
|  | Note 11, 12 | |  | 1.0/1.0 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA,UL | | |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LCCA\_DL | | |  | N/A | 7 | | | |
| WCCA\_DL | | | ms | N/A | TEvaluate\_CBD\_SSB\_CCA Note 13 | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |  | | | | |
| SNR\_SSB of set q0 | | Config 1, 2 | dB | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | | Config 1, 2 | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | | Config 1, 2 | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | | Config 1, 2 | dBm/15 KHz | -98 | | | | |
| Propagation condition | | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT window.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6A.  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.  Note 13: As defined in Table 8.5A.5.2-1. | | | | | | | | |

****

**Figure A.10.3.4.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

A.10.3.4.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 410 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.10.3.4.2 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in DRX mode

A.10.3.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5A.

The test parameters are given in Tables A.10.3.4.2.1-1, A.10.3.4.2.1-2, and A.4.5.5.2.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.10.3.4.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q0 in the active PSCell to emulate SSB based beam failure. Figure A.10.3.4.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA model. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.10.3.4.2.1-1: Supported test configurations for FR1 PSCell with CCA**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

**Table A.10.3.4.2.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Value** | **Comment** |
|  | | | | |  | **Test 1** |  |
| Active E-UTRA PCell | | | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | | | |  | 1 |  |
| Active PSCell | | | | |  | Cell 2 |  |
| RF Channel Number | | | | |  | 2 |  |
| DL CCA model | | | | |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | |  | As specified in A.3.26.2.2 |  |
| Duplex mode | | | | Config 1, 2 |  | TDD |  |
| BWchannel | | | | Config 1, 2 | MHz | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | | Config 1, 2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config 1, 2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1, 2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1, 2 |  | ULBWP.1.1 |  |
| TDD configuration | | | | Config 1, 2 |  | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | | | Config 1, 2 |  | CR.1.1 CCA |  |
| SSB Configuration | | | | Config 1, 2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | | | Config 1, 2 |  | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1, 2 |  | 30 KHz |  |
| PRACH Configuration | | | | Config 1, 2 |  | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low |  |
| Beam failure | | DCI format | | |  | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols | | |  | 2 |  |
|  | | Aggregation level | | | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size |  |
|  | | REG bundle size | | |  | 6 |  |
| DRX | | | | |  | DRX.7 | A.3.3.7 |
| Gap pattern ID | | | | |  | N.A. |  |
| gapOffset | | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2 | | | | dBm/SCS kHz | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | | Config 1, 2 | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | | Config 1, 2 | |  | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | | | |  | 0,1 |  |
| T310 timer | | | | | ms | 1000 |  |
| N310 | | | | |  | 2 |  |
| T1 | | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | 9.01 |  |
| T3 | | | | | s | 5.16 |  |
| T4 | | | | | s | 0 |  |
| T5 | | | | | s | 3.89 |  |
| D1 | | | | | s | 3.85 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | | | | |

**Table A.10.3.4.2.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA\_DL | Semi-static channel access PCCA\_DLNote 10, 12 | |  | 1.0 | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
|  | Dynamic channel access, PCCA\_DL\_1/PCCA\_DL\_2  Note 11, 12 | |  | 1.0/1.0 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA,UL | | |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LCCA\_DL | | |  | N/A | 3 | | | |
| WCCA\_DL | | | ms | N/A | TEvaluate\_CBD\_SSB\_CCA Note 13 | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | | dB |  | | | | |
| SNR\_SSB of set q0 | | Config 1, 2 | dB | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | | Config 1, 2 | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | | Config 1, 2 | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | | Config 1, 2 | dBm/15 KHz | -98 | | | | |
| Propagation condition | | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT window.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6A.  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 12: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.  Note 13: As defined in Table 8.5A.5.2-1, where LCBD,max=3 for TDRX > 320. | | | | | | | | |

****

**Figure A.10.3.4.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode**

A.10.3.4.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 3850 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

**< End of change 45>**

**< Start of change 46 (from - R4-2209076) >**

### A.10.4.3 L1-RSRP measurements for beam reporting

#### A.10.4.3.1 SSB based L1-RSRP measurement on PSCC when DRX is not used

##### A.10.4.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.1.1-1.

Table A.10.4.3.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

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

##### A.10.4.3.1.2 Test parameters

There are two cells in the test, E-UTRAN Pcell (Cell 1) and FR1 PSCell (Cell 2) which operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 are given in Table A.10.4.3.1.2-1 and Table A.10.4.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.1.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1,2 |  | freq1 |
| DL CCA model | 1,2 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1,2 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | Off |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| 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 | 1,2 | dB | 0 |
| 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 condition | 1,2 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.10.4.3.1.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1,2 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1,2 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1,2 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1,2 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2 | dBm/SSB SCS | -91.65 | | | |
|  | 1,2 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1,2 | dB | 0 | 0 | -Infinity | 3 |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS Res when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

##### A.10.4.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

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

#### A.10.4.3.2 SSB based L1-RSRP measurement on PSCC when DRX is used

##### A.10.4.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.1.1-1.

Table A.10.4.3.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

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

##### A.10.4.3.2.2 Test parameters

There are two cells in the test, E-UTRAN Pcell (Cell 1) and FR1 PSCell (Cell 2) which operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 are given in Table A.10.4.3.2.2-1 and Table A.10.4.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.2.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1,2 |  | freq1 |
| DL CCA model | 1,2 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1,2 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | DRX.3 |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| 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 | 1,2 | dB | 0 |
| 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 condition | 1,2 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.10.4.3.2.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1,2 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1,2 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1,2 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1,2 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2 | dBm/SSB SCS | -91.65 | | | |
|  | 1,2 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1,2 | dB | 0 | 0 | -Infinity | 3 |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

##### A.10.4.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

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

#### A.10.4.3.3 SSB based L1-RSRP measurement on SCC when DRX is not used

##### A.10.4.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.1.1-1.

Table A.10.4.3.3.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

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

##### A.10.4.3.3.2 Test parameters

There are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2), and FR1 SCell (Cell 3). Cell 2 and Cell 3 operate on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.10.4.3.3.2-1 and Table A.10.4.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.3.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PScell | 1,2 |  | Cell 2 |
| Active Scell | 1,2 |  | Cell 3 |
| RF Channel Number | 1,2 |  | 1: Cell 2  2: Cell 3 |
| DL CCA model | 1,2 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1,2 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | Off |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| 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 | 1,2 | dB | 0 |
| 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 condition | 1,2 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.10.4.3.3.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1, 2 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1, 2 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1, 2 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1**,** 2 | dBm/15kHz | -94.65 | | | |
| Note2 | 1**,** 2 | dBm/SSB SCS | -91.65 | | | |
|  | 1, 2 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1, 2 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1, 2 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1, 2 | dB | 0 | 0 | -Infinity | 3 |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

##### A.10.4.3.3.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 3.

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

#### A.10.4.3.4 SSB based L1-RSRP measurement on SCC when DRX is used

##### A.10.4.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.4.1-1.

Table A.10.4.3.4.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

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

##### A.10.4.3.4.2 Test parameters

There are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2), and FR1 SCell (Cell 3). Cell 2 and Cell 3 operate on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.10.4.3.4.2-1 and Table A.10.4.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.4.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PScell | 1,2 |  | Cell 2 |
| Active Scell | 1,2 |  | Cell 3 |
| RF Channel Number | 1,2 |  | 1: Cell 2  2: Cell 3 |
| DL CCA model | 1,2 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1,2 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | DRX.3 |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| 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 | 1,2 | dB | 0 |
| 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 condition | 1,2 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.10.4.3.4.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1, 2 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1, 2 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1, 2 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1, 2 | dBm/15kHz | -94.65 | | | |
| Note2 | 1, 2 | dBm/SSB SCS | -91.65 | | | |
|  | 1, 2 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1, 2 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1, 2 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1, 2 | dB | 0 | 0 | -Infinity | 3 |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

##### A.10.4.3.4.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 3.

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

**< End of change 46>**

**< Start of change 47 (from - R4-2209076) >**

### A.11.5.4 L1-RSRP measurements for beam reporting

#### A.11.5.4.1 SSB based L1-RSRP measurement when DRX is not used

##### A.11.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.1.1-1.

Table A.11.5.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.11.5.4.1.2 Test parameters

There is one cell in the test, the FR1 PCell (Cell 1). Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.1.2-1 and Table A.11.5.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.1.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1 |  | freq1 |
| DL CCA model | 1 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.1.1 CCA |
| BWchannel | 1 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 CCA |
| SSB configuration | 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | 1 |  | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.2 TDD |
| DRX configuration | 1 |  | Off |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | ssb-Index-RSRP |
| Number of reported RS | 1 |  | 2 |
| L1-RSRP reporting period | 1 | slot | 80 |
| T1 | 1 | s | 5 |
| T2 | 1 | s | 1 |
| EPRE ratio of PSS to SSS | 1 | dB | 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 condition | 1 |  | AWGN |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.11.5.4.1.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1 | dBm/15kHz | -94.65 | | | |
| Note2 | 1 | dBm/SSB SCS | -91.65 | | | |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

##### A.11.5.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.11.5.4.2 SSB based L1-RSRP measurement when DRX is used

##### A.11.5.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.2.1-1.

Table A.11.5.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.11.5.4.2.2 Test parameters

There is one cell in the test, the FR1 PCell (Cell 1). Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.2.2-1 and Table A.11.5.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.2.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1 |  | freq1 |
| DL CCA model | 1 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.1.1 CCA |
| BWchannel | 1 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 CCA |
| SSB configuration | 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | 1 |  | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.2 TDD |
| DRX configuration | 1 |  | DRX.3 |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | ssb-Index-RSRP |
| Number of reported RS | 1 |  | 2 |
| L1-RSRP reporting period | 1 | slot | 80 |
| T1 | 1 | s | 5 |
| T2 | 1 | s | 1 |
| EPRE ratio of PSS to SSS | 1 | dB | 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 condition | 1 |  | AWGN |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.11.5.4.2.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1 | dBm/15kHz | -94.65 | | | |
| Note2 | 1 | dBm/SSB SCS | -91.65 | | | |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

##### A.11.5.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

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

#### A.11.5.4.3 SSB based L1-RSRP measurement on SCC when DRX is not used

##### A.11.5.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.3.1-1.

Table A.11.5.4.3.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.11.5.4.3.2 Test parameters

There are two cells in the test, the FR1 PCell (Cell 1) and FR1 SCell (Cell 2). Both Cell 1 and Cell 2 operate on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.3.2-1 and Table A.11.5.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.3.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PCell | 1 |  | Cell 1 |
| Active SCell | 1 |  | Cell 2 |
| RF Channel Number | 1 |  | 1: Cell 1  2: Cell 2 |
| DL CCA model | 1 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.1.1 CCA |
| BWchannel | 1 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 CCA |
| SSB configuration | 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | 1 |  | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.2 TDD |
| DRX configuration | 1 |  | Off |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | ssb-Index-RSRP |
| Number of reported RS | 1 |  | 2 |
| L1-RSRP reporting period | 1 | slot | 80 |
| T1 | 1 | s | 5 |
| T2 | 1 | s | 1 |
| EPRE ratio of PSS to SSS | 1 | dB | 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 condition | 1 |  | AWGN |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.11.5.4.3.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1 | dBm/15kHz | -94.65 | | | |
| Note2 | 1 | dBm/SSB SCS | -91.65 | | | |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

##### A.11.5.4.3.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

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

#### A.11.5.4.4 SSB based L1-RSRP measurement on SCC when DRX is used

##### A.11.5.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.4.1-1.

Table A.11.5.4.4.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.11.5.4.4.2 Test parameters

There are two cells in the test, the FR1 PCell (Cell 1) and FR1 SCell (Cell 2). Both Cell 1 and Cell 2 operate on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.4.2-1 and Table A.11.5.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.4.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PCell | 1 |  | Cell 1 |
| Active SCell | 1 |  | Cell 2 |
| RF Channel Number | 1 |  | 1: Cell 1  2: Cell 2 |
| DL CCA model | 1 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.1.1 CCA |
| BWchannel | 1 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 CCA |
| SSB configuration | 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | 1 |  | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.2 TDD |
| DRX configuration | 1 |  | DRX.3 |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | ssb-Index-RSRP |
| Number of reported RS | 1 |  | 2 |
| L1-RSRP reporting period | 1 | slot | 80 |
| T1 | 1 | s | 5 |
| T2 | 1 | s | 1 |
| EPRE ratio of PSS to SSS | 1 | dB | 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 condition | 1 |  | AWGN |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.11.5.4.4.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL Note 4,6 | 1 |  | 0.9375 | 0.9375 | 0.9375 | 0.9375 |
| DL CCA Probability PCCA\_DL Note 4.7 | 1 |  | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 | 0.75/0.75 |
| UL CCA probability PCCA\_UL | 1 |  | 1.0 | 1.0 | 1.0 | 1.0 |
| Note2 | 1 | dBm/15kHz | -94.65 | | | |
| Note2 | 1 | dBm/SSB SCS | -91.65 | | | |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| 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 and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2. | | | | | | |

##### A.11.5.4.4.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

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

**< End of change 47>**