**3GPP TSG-RAN4 Meeting #98bis-e *R4-2105730***

**Electronic Meeting, April 12-20, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **draftCR** | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *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 |  | Radio Access Network | **X** | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Big CR: IAB-MT RRM test cases in 38.174 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | To incorporate draft CRs on RRM performance endorsed at RAN4#98-e. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | **RAN4#97-e:**  Big draftCR template was endorsed in R4-2017117 at RAN4#97-e.  **RAN4#98-e:**  The following draft CRs endorsed at RAN4#98-e are implemented in the big draftCR in R4-2103545:   1. R4-2103541, draftCR to introduce test configurations for IAB-MT RRM performance test Huawei, HiSilicon 2. R4-2103542, [draft CR] Test cases for timing for IAB-MT, ZTE 3. R4-2103543, draftCR to introduce test cases for RRC release with redirection for IAB-MT, Huawei, HiSilicon 4. R4-2103544, draftCR on IAB RLM test cases, Nokia, Nokia Shanghai Bell 5. R4-2103546, RRC re-establishment tests for LA IAB-MT, Ericsson   Note:   * Table numbering for certain configurations in R4-2103541 is updated to align with the corresponding section numbering. * Section numbering in tests in R4-2103543 is updated to align with the big CR template in R4-2017117.   **RAN4#98bis-e:**  The following draft CRs endorsed at RAN4#98bis-e are implemented in this big draftCR:   1. R4-2106951 Draft CR on maintenance for IAB-MT RRM test cases, Huawei, HiSilicon 2. R4-2107135, Side conditions for IAB-MT RRM test cases in TS 38.174, Ericsson 3. R4-2106952, Draft CR on test cases for RRC release with redirection for IAB-MT, Huawei, HiSilicon 4. R4-2105733, [draft CR] Test cases for timing for IAB-MT, ZTE 5. R4-2107137, CSI-RS based RLM tests for LA IAB-MT in TS 38.174, Ericsson 6. R4-2105731, [draft CR] Test cases for Beam Failure Detection and Link Recovery with CSI-RS in FR1, ZTE 7. R4-2105732, [draft CR] Test cases for Beam Failure Detection and Link Recovery with SSB in FR1, ZTE 8. R4-2105734, Draft CR to introduce test cases for BFD and LR based on SSB in FR2 for IAB-MT, Huawei, HiSilicon 9. R4-2105735, draftCR on test cases for CSI-RS based BFD and LR for IAB-MTs, Nokia, Nokia Shanghai Bell   Section G.2.2.2 Timing advance is removed as there will be no TA advance tests based on agreement in WF (R4-2105847) | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | RRM performance requirements for IAB-MT cannot be defined. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | G, G.1, G.1.1, G.1.2, G.1.3, G.1.4, G.1.5, G.1.6, G.1.7, G.1.8, G.1.9, G.1.10, G.2, G.2.1, G.2.1.1, G.2.1.1.1, G.2.1.1.2, G.2.1.1.1.1, G.2.1.1.1.2, G.2.1.1.1.3, G.2.1.1.1.4, G.2.1.1.2, G.2.1.1.2.1, G.2.1.1.2.2, G.2.2, G.2.2.1, G.2.2.1.1, G.2.2.1.2, G.2.2.1.1.1, G.2.2.1.1.2, G.2.2.2, G.2.3, G.2.3.1, G.2.3.1.1, G.2.3.1.2, G.2.3.1.3, G.2.3.1.4, G.2.3.1.5, G.2.3.1.5.1, G.2.3.1.5.2, G.2.3.1.6, G.2.3.1.6.1, G.2.3.1.6.2, G.2.3.1.7, G.2.3.1.7.1, G.2.3.1.7.2, G.2.3.1.8, G.2.3.1.8.1, G.2.3.1.8.2, G.2.3, G.2.3.2, G.2.3.2.1, G.2.3.2.2, G.2.3.2.3, G.2.3.2.4, G.3, G.3.1.1, G.3.1.1.1, G.3.1.1.2, G.3.1.1.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | The last version of the big CR endorsed in R4-2103545 in RAN4#98-e | | | | | | | | |

**----------------------START OF CHANGES----------------------------**

Annex G (normative): IAB-MT RRM Testing

The test cases defined in this Annex are to verify the minimum requirements defined in clause 12. The conducted tests are performed for IAB type 1-H, and the over the air (OTA) tests are performed for IAB type 2-O, where the conducted and radiated reference points and the IAB type are defined in clause 4.3. For the test cases for IAB-MT, the DU part is disabled during the testing. The test cases apply for Local-area IAB-MT classes, where the IAB-MT classes are defined in clause 4.4.

The test configurations and procedures are defined in following clauses and in each test cases. The test requirements are derived using the corresponding configuration parameters as example. The actual IAB-MT RRM test can be conducted by any set of configuration parameters which are left to implementations and manufacturer declarations and the corresponding test requirements shall be based on the actual configuration parameters used in the test. For example, TDD pattern and related configurations shall be configurable and left for implementation and declaration including:

* DL/UL scheduling related configuration
* PRACH configuration
* SRS configuration
* SSB configuration
* CSI-RS configuration
* BWP configuration
* SMTC configuration
* TCI state configuration
* Antenna configuration
* AoA configuration

G.1 IAB-MT RRM test configurations

G.1.1 Reference measurement channels

G.1.1.1 PDSCH

G.1.1.1.1 TDD

**Table G.1.1.1.1-1: PDSCH Reference Measurement Channels for SCS=15kHz**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | | |
| Reference channel |  | SR.1.1 TDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | 10 |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Allocated resource blocks for PDSCH Note 1 |  | 24 |  |  |  |  |  |  |
| Allocated slots per Radio Frame |  |  |  |  |  |  |  |  |
| Radio frame containing SSB | slots | Note 5 |  |  |  |  |  |  |
| Radio frame not containing SSB | slots | 4 |  |  |  |  |  |  |
| MCS table |  | 64QAM |  |  |  |  |  |  |
| MCS index |  | 4 |  |  |  |  |  |  |
| Modulation |  | QPSK |  |  |  |  |  |  |
| Target Coding Rate |  | 1/3 |  |  |  |  |  |  |
| Number of control symbols |  | 2 |  |  |  |  |  |  |
| PDSCH mapping type |  | Type A |  |  |  |  |  |  |
| Information Bit Payload |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2 | bits | 1608 |  |  |  |  |  |  |
| For slots without RMSI | bits | 1864 |  |  |  |  |  |  |
| Number of Code Blocks per slot |  | 1 |  |  |  |  |  |  |
| Binary Channel Bits Per slot |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2, Note 4 | bits | 5184 |  |  |  |  |  |  |
| For slots without RMSI Note 6 | bits | 6048 |  |  |  |  |  |  |
| Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.  Note 2: PDSCH is scheduled on the slots with RMSI.  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].  Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.  Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause G.1.5.  Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1. | | | | | | | | |

**Table G.1.1.1.1-2: PDSCH Reference Measurement Channels for SCS=30kHz**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | | |
| Reference channel |  | SR.2.1 TDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | 40 |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Allocated resource blocks for PDSCH Note 1 |  | 24 |  |  |  |  |  |  |
| Allocated slots per Radio Frame |  |  |  |  |  |  |  |  |
| Radio frame containing SSB | slots | Note 5 |  |  |  |  |  |  |
| Radio frame not containing SSB | slots | 10 |  |  |  |  |  |  |
| MCS table |  | 64QAM |  |  |  |  |  |  |
| MCS index |  | 4 |  |  |  |  |  |  |
| Modulation |  | QPSK |  |  |  |  |  |  |
| Target Coding Rate |  | 1/3 |  |  |  |  |  |  |
| Number of control symbols |  | 2 |  |  |  |  |  |  |
| PDSCH mapping type |  | Type A |  |  |  |  |  |  |
| Information Bit Payload |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2 | bits | 1608 |  |  |  |  |  |  |
| For slots without RMSI | bits | 1864 |  |  |  |  |  |  |
| Number of Code Blocks per slot |  | 1 |  |  |  |  |  |  |
| Binary Channel Bits Per slot |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2, Note 4 | bits | 5184 |  |  |  |  |  |  |
| For slots without RMSI Note 6 | bits | 6048 |  |  |  |  |  |  |
| Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.  Note 2: PDSCH is scheduled on the slots with RMSI.  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].  Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.  Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause G.1.5.  Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.. | | | | | | | | |

**Table G.1.1.1.1-3: PDSCH Reference Measurement Channels for SCS=120kHz**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | | |
| Reference channel |  | SR.3.1 TDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | 100 |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Allocated resource blocks for PDSCH Note 1 |  | 24 |  |  |  |  |  |  |
| Allocated slots per Radio Frame |  |  |  |  |  |  |  |  |
| Radio frame containing SSB | slots | Note 5 |  |  |  |  |  |  |
| Radio frame not containing SSB | slots | 48 |  |  |  |  |  |  |
| MCS table |  | 64QAM |  |  |  |  |  |  |
| MCS index |  | 4 |  |  |  |  |  |  |
| Modulation |  | QPSK |  |  |  |  |  |  |
| Target Coding Rate |  | 1/3 |  |  |  |  |  |  |
| Number of control symbols |  | 2 |  |  |  |  |  |  |
| PDSCH mapping type |  | Type A |  |  |  |  |  |  |
| Information Bit Payload |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2 | bits | 1608 |  |  |  |  |  |  |
| For slots without RMSI | bits | 1864 |  |  |  |  |  |  |
| Number of Code Blocks per slot |  | 1 |  |  |  |  |  |  |
| Binary Channel Bits Per slot |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2, Note 4 | bits | 5184 |  |  |  |  |  |  |
| For slots without RMSI Note 6 | bits | 6048 |  |  |  |  |  |  |
| Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block  Note 2: PDSCH is scheduled on the slots with RMSI.  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].  Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.  Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause G.1.5.  Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1. | | | | | | | | |

G.1.1.2 CORESET for RMSI scheduling

G.1.1.2.1 TDD

**Table G.1.1.2.1-1: RMSI CORESET Reference Channel for TDD with SCS=15KHz**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | | |
| Reference channel |  | CR.1.1 TDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | 10 |  |  |  |  |  |  |
| Subcarrier spacing | kHz | 15 |  |  |  |  |  |  |
| Allocated resource blocks for RMSI CORESET Note 7 |  | 24 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| SSB and RMSI CORESET multiplexing configuration Note 7 |  | Pattern 1 |  |  |  |  |  |  |
| Offset between SSB and RMSI CORESET Note 3, 7 | RB | 0 (Note 8) |  |  |  |  |  |  |
| Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4 |  | Index 4 |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Duration of RMSI CORESET Note 7 | symbols | 2 |  |  |  |  |  |  |
| DCI Format Note 1 |  | Note 2 |  |  |  |  |  |  |
| Aggregation level | CCE | 8 |  |  |  |  |  |  |
| DMRS precoder granularity |  | 6 |  |  |  |  |  |  |
| REG bundle size |  | 6 |  |  |  |  |  |  |
| Mapping from REG to CCE |  | Distributed |  |  |  |  |  |  |
| Cell ID |  | Note 5 |  |  |  |  |  |  |
| Payload (without CRC) | bits | Note 6 |  |  |  |  |  |  |
| Note 1: DCI formats are defined in TS 38.212.  Note 2: DCI format shall depend upon the test configuration.  Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.  Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].  Note 5: Cell ID shall depend upon the test configuration.  Note 6: Payload size shall depend upon the test configuration.  Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213 [3].  Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC. | | | | | | | | |

**Table G.1.1.2.1-2: RMSI CORESET Reference Channel for TDD with SCS=30KHz**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | | |
| Reference channel |  | CR.2.1 TDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | 40 |  |  |  |  |  |  |
| Subcarrier spacing | kHz | 30 |  |  |  |  |  |  |
| Allocated resource blocks for RMSI CORESET Note 7 |  | 24 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| SSB and RMSI CORESET multiplexing configuration Note 7 |  | Pattern 1 |  |  |  |  |  |  |
| Offset between SSB and RMSI CORESET Note 3, 7 | RB | 0 (Note 8) |  |  |  |  |  |  |
| Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4 |  | Index 4 |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Duration of RMSI CORESET Note 7 | symbols | 2 |  |  |  |  |  |  |
| DCI Format Note 1 |  | Note 2 |  |  |  |  |  |  |
| Aggregation level | CCE | 8 |  |  |  |  |  |  |
| DMRS precoder granularity |  | 6 |  |  |  |  |  |  |
| REG bundle size |  | 6 |  |  |  |  |  |  |
| Mapping from REG to CCE |  | Distributed |  |  |  |  |  |  |
| Cell ID |  | Note 5 |  |  |  |  |  |  |
| Payload (without CRC) | bits | Note 6 |  |  |  |  |  |  |
| Note 1: DCI formats are defined in TS 38.212.  Note 2: DCI format shall depend upon the test configuration.  Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.  Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].  Note 5: Cell ID shall depend upon the test configuration.  Note 6: Payload size shall depend upon the test configuration.  Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-6 in TS 38.213 [3].  Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC. | | | | | | | | |

**Table G.1.1.2.1-3: RMSI CORESET Reference Channel for TDD with SCS=120KHz**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | | |
| Reference channel |  | CR.3.1 TDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | 100 |  |  |  |  |  |  |
| Subcarrier spacing | kHz | 120 |  |  |  |  |  |  |
| Allocated resource blocks for RMSI CORESET Note 7 |  | 24 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| SSB and RMSI CORESET multiplexing configuration Note 7 |  | Pattern 1 |  |  |  |  |  |  |
| Offset between SSB and RMSI CORESET Note 3, 7 | RB | 0 (Note 8) |  |  |  |  |  |  |
| Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4 |  | Index 4 |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Duration of RMSI CORESET Note 7 | symbols | 2 |  |  |  |  |  |  |
| DCI Format Note 1 |  | Note 2 |  |  |  |  |  |  |
| Aggregation level | CCE | 8 |  |  |  |  |  |  |
| DMRS precoder granularity |  | 6 |  |  |  |  |  |  |
| REG bundle size |  | 6 |  |  |  |  |  |  |
| Mapping from REG to CCE |  | Distributed |  |  |  |  |  |  |
| Cell ID |  | Note 5 |  |  |  |  |  |  |
| Payload (without CRC) | bits | Note 6 |  |  |  |  |  |  |
| Note 1: DCI formats are defined in TS 38.212.  Note 2: DCI format shall depend upon the test configuration.  Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.  Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-12 in TS 38.213 [3].  Note 5: Cell ID shall depend upon the test configuration.  Note 6: Payload size shall depend upon the test configuration.  Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-8 in TS 38.213 [3].  Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC. | | | | | | | | |

G.1.1.3 CORESET for RMC scheduling

G.1.1.3.1 TDD

**Table G.1.1.3.1-1: Control Channel RMC for TDD with SCS=15KHz**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | | |
| Reference channel |  | CCR.1.1 TDD | CCR.1.2 TDD |  |  |  |  |  |
| Subcarrier spacing | kHz | 15 | 15 |  |  |  |  |  |
| Allocated resource blocks for CORESET Note 3 |  | 24 | 18 |  |  |  |  |  |
| Number of transmitter antennas |  | 1 | 1 |  |  |  |  |  |
| Duration of CORESET | symbols | 2 | 2 |  |  |  |  |  |
| REG bundle size |  | 6 | 6 |  |  |  |  |  |
| DMRS precoder granularity |  | Same as REG bundle size | Same as REG bundle size |  |  |  |  |  |
| CCE to REG mapping |  | Interleaved | Interleaved |  |  |  |  |  |
| Interleave n\_shift |  | 0 | 0 |  |  |  |  |  |
| Interleave size |  | 2 | 2 |  |  |  |  |  |
| Beamforming Pre-Coder |  | N/A | N/A |  |  |  |  |  |
| Aggregation level | CCE | 8 | 4 |  |  |  |  |  |
| DCI formats |  | Note 1 | Note 1 |  |  |  |  |  |
| Payload size (without CRC) | bits | Note 2 | Note 2 |  |  |  |  |  |
| Note 1: DCI format shall depend upon the test configuration.  Note 2: Payload size shall depend upon the test configuration  Note 3: Allocated in the resource blocks where the associated RMC is scheduled. | | | | | | | | |

**Table G.1.1.3.1-2: Control Channel RMC for TDD with SCS=30KHz**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | | |
| Reference channel |  | CCR.2.1 TDD |  |  |  |  |  |  |
| Subcarrier spacing | kHz | 30 |  |  |  |  |  |  |
| Allocated resource blocks for CORESET Note 3 |  | 24 |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Duration of CORESET | symbols | 2 |  |  |  |  |  |  |
| REG bundle size |  | 6 |  |  |  |  |  |  |
| DMRS precoder granularity |  | Same as REG bundle size |  |  |  |  |  |  |
| CCE to REG mapping |  | Interleaved |  |  |  |  |  |  |
| Interleave n\_shift |  | 0 |  |  |  |  |  |  |
| Interleave size |  | 2 |  |  |  |  |  |  |
| Beamforming Pre-Coder |  | N/A |  |  |  |  |  |  |
| Aggregation level | CCE | 8 |  |  |  |  |  |  |
| DCI formats |  | Note 1 |  |  |  |  |  |  |
| Payload size (without CRC) | bits | Note 2 |  |  |  |  |  |  |
| Note 1: DCI format shall depend upon the test configuration.  Note 2: Payload size shall depend upon the test configuration.  Note 3: Allocated in the same resource blocks where the associated RMC is scheduled. | | | | | | | | |

**Table G.1.1.3.1-3: Control Channel RMC for TDD with SCS=120KHz**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | | |
| Reference channel |  | CCR.3.1 TDD | CCR.3.2 TDD | CCR.3.3 TDD |  |  |  |  |
| Subcarrier spacing | kHz | 120 | 120 | 120 |  |  |  |  |
| Allocated resource blocks for CORESET Note 3 |  | 24 | 24 | 24 |  |  |  |  |
| Number of transmitter antennas |  | 1 | 1 | 1 |  |  |  |  |
| monitoringSlotPeriodicityAndOffset |  | sl160  0 | sl160  0 | sl160  80 |  |  |  |  |
| monitoringSymbolsWithinSlot |  | 1100000  0000000 | 0011000  0000000 | 1100000  0000000 |  |  |  |  |
| Duration of CORESET | slot | 1 | 1 | 1 |  |  |  |  |
| REG bundle size |  | 6 | 6 | 6 |  |  |  |  |
| DMRS precoder granularity |  | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size |  |  |  |  |
| CCE to REG mapping |  | Interleaved | Interleaved | Interleaved |  |  |  |  |
| Interleave n\_shift |  | 0 | 0 | 0 |  |  |  |  |
| Interleave size |  | 2 | 2 | 2 |  |  |  |  |
| Beamforming Pre-Coder |  | N/A | N/A | N/A |  |  |  |  |
| Aggregation level | CCE | 8 | 8 | 8 |  |  |  |  |
| DCI formats |  | Note 1 | Note 1 | Note 1 |  |  |  |  |
| Payload size (without CRC) | bits | Note 2 | Note 2 | Note 2 |  |  |  |  |
| Note 1: DCI format shall depend upon the test configuration.  Note 2: Payload size shall depend upon the test configuration.  Note 3: Allocated in the same resource blocks where the associated PDSCH RMC is scheduled. | | | | | | | | |

G.1.2 OFDMA channel noise generator (OCNG)

G.1.2.1 Generic OFDMA Channel Noise Generator (OCNG)

The OCNG pattern is used in a test for modelling allocations of unused resources in the channel bandwidth to virtual IAB-MTs (which are not under test). The OCNG pattern comprises PDCCH and PDSCH transmissions to the virtual IAB-MTs.

G.1.2.1.1 OCNG pattern 1: Generic OCNG pattern for all unused REs

**Table G.1.2.1.1-1: OP.1: Generic OCNG pattern for all unused REs**

|  |  |  |
| --- | --- | --- |
| **OCNG Parameters** | **Control Region** | **Data Region** |
| Resource allocation | Unused REs (Note 1) | Unused REs (Note 2) |
| Channel | PDCCH | PDSCH |
| Contents | Virtual IAB-MT IDs | Uncorrelated pseudo random QPSK modulated data |
| Antenna transmission scheme | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Subcarrier spacing | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Aggregation level | Same as used in PDCCH RMC | N/A |
| Code rate | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Transmit Power | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| CP length | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the IAB-MT under test.  Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell. | | |

G.1.2.1.2 OCNG pattern 2: Generic OCNG pattern for all unused REs for 2AoA setup

**Table G.1.2.1.2-1: OP.2: Generic OCNG pattern for all unused REs for 2AoA setup**

|  |  |  |
| --- | --- | --- |
| **OCNG Parameters** | **Control Region** | **Data Region** |
| Probe | Transmitting the serving beam | |
| Resource allocation | Unused REs (Note 1) in the symbols where SSB/CSI-RS are not transmitted from both the serving beam probe and non-serving beam probe. | Unused REs (Note 2) in the symbols where SSB/CSI-RS are not transmitted from both the serving beam probe and non-serving beam probe. |
| Channel | PDCCH | PDSCH |
| Contents | Virtual IAB-MT IDs | Uncorrelated pseudo random QPSK modulated data |
| Antenna transmission scheme | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Subcarrier spacing | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Aggregation level | Same as used in PDCCH RMC | N/A |
| Code rate | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Transmit Power | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| CP length | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the IAB-MT under test.  Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell.  Note 3: No OCNG is transmitted from the probe transmitting non-serving beam. | | |

G.1.2.1.3 OCNG pattern 3: Generic OCNG pattern for unused REs in the same bandwidth as PDSCH RMC

**Table G.1.2.1.3-1: OP.3: Generic OCNG pattern for unused REs in the same BW as RMC**

|  |  |  |
| --- | --- | --- |
| **OCNG Parameters** | **Control Region** | **Data Region** |
| Resource allocation | Unused REs (Note 1) | Unused REs (Note 2) |
| Channel | PDCCH | PDSCH |
| Contents | Virtual IAB-MT IDs | Uncorrelated pseudo random QPSK modulated data |
| Antenna transmission scheme | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Subcarrier spacing | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Aggregation level | Same as used in PDCCH RMC | N/A |
| Code rate | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Transmit Power | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| CP length | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the IAB-MT under test. REs for OCNG shall not be allocated outside the allocated bandwidth of the PDSCH RMC of the serving cell.  Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the allocated bandwidth of the PDSCH RMC of the serving cell. REs for OCNG shall not be allocated outside the allocated bandwidth of the PDSCH RMC of the serving cell. | | |

G.1.2.1.4 OCNG pattern 4: Generic OCNG pattern for all unused REs outside SSB slot(s)

**Table G.1.2.1.4-1: OP.4: Generic OCNG pattern for all unused REs outside SSB slot(s)**

|  |  |  |
| --- | --- | --- |
| **OCNG Parameters** | **Control Region** | **Data Region** |
| Resource allocation | Unused REs (Note 1) | Unused REs (Note 2) |
| Channel | PDCCH | PDSCH |
| Contents | Virtual IAB-MT IDs | Uncorrelated pseudo random QPSK modulated data |
| Antenna transmission scheme | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Subcarrier spacing | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Aggregation level | Same as used in PDCCH RMC | N/A |
| Code rate | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Transmit Power | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| CP length | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the IAB-MT under test. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell.  Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell. | | |

G.1.3 Antenna configurations

G.1.3.1 Antenna configurations for FR1

Unless otherwise specified, NR TDD cells in all RRM Test cases in AWGN propagation condition are configured with Antenna Configuration [1x2].

G.1.3.1.1 Antenna connection for 4 Rx capable IAB-MT

G.1.3.1.1.1 Introduction

All tests for FR1 are specified for IAB-MTs supporting 2RX. In this clause, the antenna connection method for applying 2RX tests to IAB-MTs supporting 4RX antenna ports is specified. No tests are currently specified for FR1 which are applicable only to 4RX antenna ports, so 4RX capable IAB-MTs are always tested by reusing tests which were originally specified for 2RX IAB-MTs.

G.1.3.1.1.2 Principle of testing

G.1.3.1.1.2.1 Single carrier tests

For 4RX capable IAB-MTs supporting at least one 2RX band, the, all single carrier tests specified for FR1 except those in G.2.3 shall be tested on any band where 2RX is supported with the antenna connection specified in clause G.1.3.1.1.2.2.

For 4RX capable IAB-MT which do not support any 2RX band, all tests specified for FR1 shall be tested using the antenna connection specified in clause G.1.3.1.1.2.3. For radio link monitoring tests, the SNR levels are modified according to table G.1.3.1.1.2.1-1 and table G.1.3.1.1.2.1-2. For beam failure detection and link recovery tests, the SNR levels are modified according to table G.1.3.1.1.2.1-3.

**Table G.1.3.1.1.2.1-1: Modified parameters for RLM out of sync testing with 4 RX antenna connection**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test case** | **SNR during T3 (dB)** | | | |
|  | **Test 1** | **Test 2** | **Test 3** | **Test 4** |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |
| TBD | -18 | N/A | N/A | N/A |

**Table G.1.3.1.1.2.1-2: Modified parameters for RLM in sync single carrier testing with 4 RX antenna connection**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test case** | **SNR during T3 (dB)** | | **SNR during T4 (dB)** | |
|  | **Test 1** | **Test 2** | **Test 1** | **Test 2** |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |
| TBD | -18 | N/A | -8 | N/A |

**Table G.1.3.1.1.2.1-3: Modified parameters for Beam Failure Detection and Link Recovery testing with 4 RX antenna connection**

|  |  |
| --- | --- |
| **Test case** | **SNR for RS in set q0 during T3, T4 and T5 (dB)** |
|  | **Test 1** |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |
| TBD | -15 |

G.1.3.1.1.2.2 Antenna connection for bands where 2RX is supported

For bands where 2RX is supported, it is left to declaration and AP configuration to decide which 2 of the 4 Rx ports are connected with data source from tester. The remaining 2 Rx ports shall be connected with zero input**.** No test parameters or requirements are modified.

G.1.3.1.1.2.3 Antenna connection for bands where 4RX is supported

For bands where 4RX is supported, all 4 RX antennas are connected with data source from tester**.** The Tester provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses G.1.3.1.1.2.1 and G.1.3.1.1.2.2, no test parameters or requirements are modified.

G.1.3.2 Antenna configurations for FR2

Unless otherwise specified, the default Downlink Antenna Configuration for NR FR2 cells is 1x2.

In case of Downlink Antenna Configuration 2x2 for NR FR2 cells, unless otherwise specified, the downlink signal is transmitted over the two polarizations (V and H) of the dual polarized antenna of the test equipment.

G.1.4 BWP configurations

G.1.4.1 Introduction

This clause provides the typical BWP configurations used for RRM test cases defined in Annex G. For downlink BWP, both initial BWP and dedicated BWP configurations are specified in clause G.1.4.2 and for uplink BWP, both initial BWP and dedicated BWP configurations are specified in clause G.1.4.3.

G.1.4.2 Downlink BWP configurations

G.1.4.2.1 Initial BWP

**Table G.1.4.2.1-1: Downlink BWP patterns for initial BWP configuration**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BWP Parameters** | **Unit** | **Values** | | |
| Reference BWP |  | DLBWP.0.1 | DLBWP.0.2 |  |
| Starting PRB index |  | 0 | RBa Note 1 |  |
| Bandwidth | RB | Same as RF channel defined in each test | same as RMSI CORESET (CORESET #0) defined in each test |  |
| Note 1: RBa is the lowest PRB index to guarantee the BWP including SSB PRB index (RBJ, RBJ+1,.…, RBJ+19) which is defined in Clause G.1.5. | | | | |

G.1.4.2.2 Dedicated BWP

**Table G.1.4.2.2-1: Downlink BWP patterns for dedicated BWP configuration**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BWP Parameters** | **Unit** | **Values** | | |
| Reference BWP |  | DLBWP.1.1 | DLBWP.1.2 | DLBWP.1.3 |
| Starting PRB index |  | 0 | RBb Note 1 | RBa Note 2 |
| Bandwidth | RB | Same as RF channel defined in each test | 25 for SCS = 15KHz,  51 for SCS = 30KHz,  32 for SCS = 120KHz | 25 for SCS = 15KHz,  51 for SCS = 30KHz,  32 for SCS = 120KHz |
| Note 1: RBb is the lowest PRB index to guarantee the BWP not fully overlapped with SSB PRB index (RBJ, RBJ+1,.…, RBJ+19) which is defined in Clause G.1.5.  Note 2: RBa is the lowest PRB index to guarantee the BWP including SSB PRB index (RBJ, RBJ+1,.…, RBJ+19) which is defined in Clause G.1.5. | | | | |

G.1.4.3 Uplink BWP configurations

G.1.4.3.1 Initial BWP

**Table G.1.4.3.1-1: Uplink BWP patterns for initial BWP configuration**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BWP Parameters** | **Unit** | **Values** | | |
| Reference BWP |  | ULBWP.0.1 | ULBWP.0.2 |  |
| Starting PRB index |  | 0 | RBa Note 1 |  |
| Bandwidth | RB | Same as RF channel defined in each test | same as RMSI CORESET (CORESET #0) defined in each test |  |
| Note 1: RBa is same as RBa for DLBWP.0.2 as defined in Table G.1.4.2.1-1. | | | | |

G.1.4.3.2 Dedicated BWP

**Table G.1.4.3.2-1: Uplink BWP patterns for dedicated BWP configuration**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BWP Parameters** | **Unit** | **Values** | | |
| Reference BWP |  | ULBWP.1.1 | ULBWP.1.2 | ULBWP.1.3 |
| Starting PRB index |  | 0 | RBb Note 1 | RBa Note 2 |
| Bandwidth | RB | Same as RF channel defined in each test | 25 for SCS = 15KHz,  51 for SCS = 30KHz,  32 for SCS = 120KHz | 25 for SCS = 15KHz,  51 for SCS = 30KHz,  32 for SCS = 120KHz |
| Note 1: RBb is same as RBb for DLBWP.1.2 as defined in Table G.1.4.2.2-1.  Note 2: RBa is same as RBa for DLBWP.1.3 as defined in Table G.1.4.2.2-1. | | | | |

G.1.5 SSB Configurations

G.1.5.1 SSB Configurations for FR1

G.1.5.1.1 SSB pattern 1 in FR1: SSB allocation for SSB SCS=15 kHz

**Table G.1.5.1.1-1: SSB.1 FR1: SSB Pattern 1 for SSB SCS=15 kHz in 10 MHz channel**

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| SSB SCS | 15 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 2 | 2-5 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

G.1.5.1.2 SSB pattern 2 in FR1: SSB allocation for SSB SCS=30 kHz

**Table G.1.5.1.2-1: SSB.2 FR1: SSB Pattern 2 for SSB SCS=30 kHz**

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| SSB SCS | 30 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 3 | 4-7 or 2-5 Note 2 |
| Slot numbers containing SSB Note 3 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3  Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as define in clause 5.4.3]; Otherwise, symbol 2-5 is chosen.  Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves | |

G.1.5.1.3 SSB pattern 3 in FR1: SSB allocation for SSB SCS=15 kHz

**Table G.1.5.1.3-1: SSB.3 FR1: SSB Pattern 3 for SSB SCS=15 kHz**

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| SSB SCS | 15 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSB Note 2 | 2-5 | 8-11 |
| Slot numbers containing SSB Note 2 | 0 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

G.1.5.1.4 SSB pattern 4 in FR1: SSB allocation for SSB SCS=30 kHz

**Table G.1.5.1.4-1: SSB.4 FR1: SSB Pattern 4 for SSB SCS=30 kHz**

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| SSB SCS | 30 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSB Note 3 | 4-7 or 2-5 Note 2 | 8-11 |
| Slot numbers containing SSB Note 3 | 0 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as defined in clause 5.4.3; Otherwise, symbol 2-5 is chosen.  Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

G.1.5.1.5 SSB pattern 5 in FR1: SSB allocation for SSB SCS=15 kHz starting from odd SFN

**Table G.1.5.1.5-1: SSB.5 FR1: SSB Pattern 5 for SSB SCS=15 kHz in**

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| SSB SCS | 15 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 2 | 2-5 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 1 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

G.1.5.1.6 SSB pattern 6 in FR1: SSB allocation for SSB SCS=30 kHz starting from odd SFN

**Table G.1.5.1.6-1: SSB.6 FR1: SSB Pattern 6 for SSB SCS=30 kHz**

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| SSB SCS | 30 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 3 | 4-7 or 2-5 Note 2 |
| Slot numbers containing SSB Note 3 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 1 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3  Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as defined in clause 5.4.3; Otherwise, symbol 2-5 is chosen.  Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

G.1.5.2 SSB Configurations for FR2

G.1.5.2.1 SSB pattern 1 in FR2: SSB allocation for SSB SCS=120 kHz

**Table G.1.5.2.1-1: SSB.1 FR2: SSB Pattern 1 for SSB SCS = 120 kHz with 2 SSBs per SS-burst**

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| SSB SCS | 120 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSBs Note 2 | 4-7 | 8-11 |
| Slot numbers containing SSB Note 2 | 0 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

G.1.5.2.2 SSB pattern 2 in FR2: SSB allocation for SSB SCS=240 kHz

**Table G.1.5.2.2-1: SSB.2 FR2: SSB Pattern 2 for SSB SCS = 240 kHz with 2 SSBs per SS-burst**

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| SSB SCS | 240 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSBs Note 2 | 8-11 | 12-13, 0-1 |
| Slot numbers containing SSB Note 2 | 0 | 0, 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

G.1.5.2.3 SSB pattern 3 in FR2: SSB allocation for SSB SCS=120 kHz

**Table G.1.5.2.3-1: SSB.3 FR2: SSB Pattern 3 for SSB SCS = 120 kHz with 1 SSB per SS-burst**

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| SSB SCS | 120 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSBs Note 2 | 4-7 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

G.1.5.2.4 SSB pattern 4 in FR2: SSB allocation for SSB SCS=240 kHz

**Table G.1.5.2.4-1: SSB.4 FR2: SSB Pattern 4 for SSB SCS = 240 kHz with 1 SSB per SS-burst**

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| SSB SCS | 240 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSBs Note 2 | 8-11 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

G.1.5.2.5 SSB pattern 5 in FR2: SSB allocation for SSB SCS=120 kHz

**Table G.1.5.2.5-1: SSB.5 FR2: SSB Pattern 5 for SSB SCS = 120 kHz with 2 SSBs per SS-burst**

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| SSB SCS | 120 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 6-9 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

G.1.5.2.6 SSB pattern 6 in FR2: SSB allocation for SSB SCS=240 kHz

**Table G.1.5.2.6-1: SSB.6 FR2: SSB Pattern 6 for SSB SCS = 240 kHz with 2 SSBs per SS-burst**

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| SSB SCS | 240 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 6-9 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

G.1.5.2.7 SSB pattern 7 in FR2: SSB allocation for SSB SCS=120 kHz

**Table G.1.5.2.7-1: SSB.7 FR2: SSB Pattern 7 for SSB SCS = 120 kHz with 1 SSB per SS-burst**

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| SSB SCS | 120 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 1 |
| Symbol numbers containing SSBs Note 2 | 8-11 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

G.1.5.2.8 SSB pattern 8 in FR2: SSB allocation for SSB SCS=240 kHz

**Table G.1.5.2.8-1: SSB.8 FR2: SSB Pattern 8 for SSB SCS = 240 kHz with 1 SSB per SS-burst**

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| SSB SCS | 240 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 1 | |
| SS/PBCH block index | 1 | |
| Symbol numbers containing SSBs Note 2 | 12-13 | 0-1 |
| Slot numbers containing SSB Note 2 | 0 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in clause 5.4.3.  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

G.1.6 SMTC Configurations

G.1.6.1 SMTC pattern 1: SMTC period = 20 ms with SMTC duration = 1 ms

**Table G.1.6.1-1: SMTC.1: SMTC Pattern 1 for SMTC period = 20 ms and duration = 1 ms**

|  |  |
| --- | --- |
| **SMTC Parameters** | **Values** |
| SMTC periodicity | 20 ms |
| SMTC offset | 0 ms |
| SMTC duration | 1 ms |

G.1.6.2 SMTC pattern 2: SMTC period = 20 ms with SMTC duration = 5 ms

**Table G.1.6.2-1: SMTC.2: SMTC Pattern 2 for SMTC period = 20 ms and duration = 5 ms**

|  |  |
| --- | --- |
| **SMTC Parameters** | **Values** |
| SMTC periodicity | 20 ms |
| SMTC offset | 0 ms |
| SMTC duration | 5 ms |

G.1.6.3 SMTC pattern 3: SMTC period = 160 ms with SMTC duration = 1 ms

**Table G.1.6.3-1: SMTC.3: SMTC Pattern 3 for SMTC period = 20 ms and duration = 5 ms**

|  |  |
| --- | --- |
| **SMTC Parameters** | **Values** |
| SMTC periodicity | 160 ms |
| SMTC offset | 0 ms |
| SMTC duration | 1 ms |

G.1.6.4 SMTC pattern 4: SMTC period = 20 ms with SMTC duration = 1 ms

**Table G.1.6.4-1: SMTC.4: SMTC Pattern 4 for SMTC period = 20 ms and duration = 1 ms**

|  |  |
| --- | --- |
| **SMTC Parameters** | **Values** |
| SMTC periodicity | 20 ms |
| SMTC offset | 10 ms |
| SMTC duration | 1 ms |

G.1.6.5 SMTC pattern 5: SMTC period = 20 ms with SMTC duration = 5 ms

**Table G.1.6.4-1: SMTC.5: SMTC Pattern 5 for SMTC period = 20 ms and duration = 5 ms**

|  |  |
| --- | --- |
| **SMTC Parameters** | **Values** |
| SMTC periodicity | 20 ms |
| SMTC offset | 10 ms |
| SMTC duration | 5 ms |

G.1.7 CSI-RS configurations

G.1.7.1 TDD

**Table G.1.7.1-1: CSI-RS Reference Measurement Channels for SCS=15kHz**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **CSI-RS.1.1 TDD** | **CSI-RS.1.2 TDD** | **CSI-RS.1.3 TDD** | **CSI-RS.1.4 TDD** |
| Resource Type | periodic | periodic | aperiodic | aperiodic |
| **Resource Set Config** |  |  |  |  |
| nzp-CSI-ResourceSetId | 0 | 0 | 0 | 0 |
| repetition | n.a. | off | off | on |
| aperiodicTriggeringOffset | n.a. | n.a. | 6 | 6 |
| trs-Info | n.a. | n.a. | n.a. | n.a. |
| **Resource Config** |  |  |  |  |
|  |  | 10 for resource #0 | 20 for resource #0 | 0 for resource #0 |
|  |  |  |  | 1 for resource #1 |
|  |  |  |  | 2 for resource #2 |
|  |  |  |  | 3 for resource #3 |
| nzp-CSI-RS-ResourceId | 0 for resource #0 | 11 for resource #1 | 21 for resource #1 | 4 for resource #4 |
|  |  |  |  | 5 for resource #5 |
|  |  |  |  | 6 for resource #6 |
|  |  |  |  | 7 for resource #7 |
| powerControlOffset | 0 | 0 | 0 | 0 |
| powerControlOffsetSS | db0 | db0 | db0 | db0 |
| scramblingID | 0 | 0 | 0 | 0 |
| Period (slots) | slot5 | slot10 | n.a. | n.a. |
| qcl-InfoPeriodicCSI-RS | TCI.State.0 | TCI.State.0 | n.a. | n.a. |
|  |  | TCI.State.1 |  |  |
| frequencyDomainAllocation | 000001 | 000001 | 000001 | 000001 |
| nrofPorts | 2 | 1 | 1 | 1 |
|  |  | 6 for resource #0 | 6 for resource #0 | 0 for resource #0 |
|  |  |  |  | 1 for resource #1 |
|  |  |  |  | 2 for resource #2 |
|  |  |  |  | 3 for resource #3 |
| firstOFDMSymbolInTimeDomain | 5 for resource #0 | 10 for resource #1 | 10 for resource #1 | 4 for resource #4 |
|  |  |  |  | 5 for resource #5 |
|  |  |  |  | 6 for resource #6 |
|  |  |  |  | 7 for resource #7 |
| cdm-Type | FD-CDM2 | noCDM | noCDM | noCDM |
| density | 1 | 3 | 3 | 3 |
| startingRB | 0 | 0 | 0 | 0 |
| nrofRBs | 276 (Note 1) | 276 (Note 1) | 276 (Note 1) | 276 (Note 1) |
| Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP. | | | | |

**Table G.1.7.1-2: CSI-RS Reference Measurement Channels for SCS=30kHz**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **CSI-RS.2.1 TDD** | **CSI-RS.2.2 TDD** | **CSI-RS.2.3 TDD** | **CSI-RS.2.4 TDD** |
| Resource Type | periodic | periodic | aperiodic | aperiodic |
| **Resource Set Config** |  |  |  |  |
| nzp-CSI-ResourceSetId | 0 | 0 | 0 | 0 |
| repetition | n.a. | off | off | on |
| aperiodicTriggeringOffset | n.a. | n.a. | 6 | 6 |
| trs-Info | n.a. | n.a. | n.a. | n.a. |
| **Resource Config** |  |  |  |  |
|  |  | 10 for resource #0 | 20 for resource #0 | 0 for resource #0 |
|  |  |  |  | 1 for resource #1 |
|  |  |  |  | 2 for resource #2 |
|  |  |  |  | 3 for resource #3 |
| nzp-CSI-RS-ResourceId | 0 for resource #0 | 11 for resource #1 | 21 for resource #1 | 4 for resource #4 |
|  |  |  |  | 5 for resource #5 |
|  |  |  |  | 6 for resource #6 |
|  |  |  |  | 7 for resource #7 |
| powerControlOffset | 0 | 0 | 0 | 0 |
| powerControlOffsetSS | db0 | db0 | db0 | db0 |
| scramblingID | 0 | 0 | 0 | 0 |
| Period (slots) | slot10 | slot20 | n.a. | n.a. |
| qcl-InfoPeriodicCSI-RS | TCI.State.0 | TCI.State.0 | n.a. | n.a. |
|  |  | TCI.State.1 |  |  |
| frequencyDomainAllocation | 000001 | 000001 | 000001 | 000001 |
| nrofPorts | 2 | 1 | 1 | 1 |
|  |  | 6 for resource #0 | 6 for resource #0 | 0 for resource #0 |
|  |  |  |  | 1 for resource #1 |
|  |  |  |  | 2 for resource #2 |
|  |  |  |  | 3 for resource #3 |
| firstOFDMSymbolInTimeDomain | 5 for resource #0 | 10 for resource #1 | 10 for resource #1 | 4 for resource #4 |
|  |  |  |  | 5 for resource #5 |
|  |  |  |  | 6 for resource #6 |
|  |  |  |  | 7 for resource #7 |
| cdm-Type | FD-CDM2 | noCDM | noCDM | noCDM |
| density | 1 | 3 | 3 | 3 |
| startingRB | 0 | 0 | 0 | 0 |
| nrofRBs | 276 (Note 1) | 276 (Note 1) | 276 (Note 1) | 276 (Note 1) |
| Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP. | | | | |

**Table G.1.7.1-3: CSI-RS Reference Measurement Channels for SCS=120kHz**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **CSI-RS.3.1 TDD** | **CSI-RS.3.2 TDD** | **CSI-RS.3.3 TDD** | **CSI-RS.3.4 TDD** |
| Resource Type | periodic | periodic | aperiodic | aperiodic |
| **Resource Set Config** |  |  |  |  |
| nzp-CSI-ResourceSetId | 0 | 0 | 0 | 0 |
| repetition | n.a. | off | off | on |
| aperiodicTriggeringOffset | n.a. | n.a. | 6 | 6 |
| trs-Info | n.a. | n.a. | n.a. | n.a. |
| **Resource Config** |  |  |  |  |
|  |  | 10 for resource #0 | 20 for resource #0 | 0 for resource #0 |
|  |  |  |  | 1 for resource #1 |
|  |  |  |  | 2 for resource #2 |
|  |  |  |  | 3 for resource #3 |
| nzp-CSI-RS-ResourceId | 0 for resource #0 | 11 for resource #1 | 21 for resource #1 | 4 for resource #4 |
|  |  |  |  | 5 for resource #5 |
|  |  |  |  | 6 for resource #6 |
|  |  |  |  | 7 for resource #7 |
| powerControlOffset | 0 | 0 | 0 | 0 |
| powerControlOffsetSS | db0 | db0 | db0 | db0 |
| scramblingID | 0 | 0 | 0 | 0 |
| Period (slots) | slot40 | slot80 | n.a. | n.a. |
| qcl-InfoPeriodicCSI-RS | TCI.State.0 | TCI.State.0 | n.a. | n.a. |
|  |  | TCI.State.1 |  |  |
| frequencyDomainAllocation | 000001 | 000001 | 000001 | 000001 |
| nrofPorts | 1 | 1 | 1 | 1 |
|  |  | 6 for resource #0 | 6 for resource #0 | 0 for resource #0 |
|  |  |  |  | 1 for resource #1 |
|  |  |  |  | 2 for resource #2 |
|  |  |  |  | 3 for resource #3 |
| firstOFDMSymbolInTimeDomain | 5 for resource #0 | 10 for resource #1 | 10 for resource #1 | 4 for resource #4 |
|  |  |  |  | 5 for resource #5 |
|  |  |  |  | 6 for resource #6 |
|  |  |  |  | 7 for resource #7 |
| cdm-Type | FD-CDM2 | noCDM | noCDM | noCDM |
| density | 1 | 3 | 3 | 3 |
| startingRB | 0 | 0 | 0 | 0 |
| nrofRBs | 276 (Note 1) | 276 (Note 1) | 276 (Note 1) | 276 (Note 1) |
| Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP. | | | | |

G.1.8 Angle of Arrival (AoA) for FR2 RRM test cases

This clause specifies the AoA setups for FR2 RRM test cases. The applicable AoA setup is defined in each test case.

G.1.8.1 Setup 1: Single AoA

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, are aligned to AoA based upon the declaration.

G.1.8.2 Setup 2: 2 AoAs

There are 2 active probes in the test. The DL signals, and noise if applicable, transmitted from the two active probes, align to AoAs based upon the declaration.

G.1.9 TCI State Configuration

G.1.9.1 Introduction

This clause provides the configurations for TCI states towards either SSB or CSI-RS. The TCI states defined in this clause are configured in each test when applicable to indicate that certain DL signals are QCL’ed with the referenceSignal configured in the TCI states.

G.1.9.2 TCI states

**Table G.1.9.2-1: TCI States**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **TCI.State.0** | **TCI.State.1** | **TCI.State.2** | **TCI.State.3** |
| tci-StateId | Id0 | Id1 | Id2 | Id3 |
| qcl-Type1 | typeC | typeC | typeA | typeA |
| qcl-Type2Note1 | typeD | typeD | typeD | typeD |
| referenceSignal | SSB0 | SSB1 | Resource #4 in TRS resource set 1 Note3 | Resource #4 in TRS resource set 2 Note3 |
| Note 1: qcl-Type2 of typeD only where applicable. For RRM test cases, this will be only in FR2  Note 2: referenceSignal configurations towards which the TCI states are configured are defined in a test-specific manner.  Note 3: Reference TRS resource sets are defined in G.1.10, and the applicable TRS resource set(s) are specified in each test case. When a single TRS resource set is configured in a test case, it is considered as resource set 1. | | | | |

G.1.10 Configurations of CSI-RS for tracking

G.1.10.1 Configuration of CSI-RS for tracking for FR1

G.1.10.1.2 TDD

**Table G.1.10.1.2-1: CSI-RS for tracking for SCS=15kHz**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | TRS.1.1 TDD |
| Bandwidth |  | BW of Active BWPNote 1 |
| SCS | kHz | 15 |
| First subcarrier index in the PRB used for CSI-RS |  | k0=0 for CSI-RS resource 1,2,3,4 |
| First OFDM symbol in the slot used for CSI-RS |  | l0 = 5 for CSI-RS resource 1 and 3  l0 = 9 for CSI-RS resource 2 and 4 |
| Number of CSI-RS ports (X) |  | 1 for CSI-RS resource 1,2,3,4 |
| CDM Type |  | ‘No CDM’ for CSI-RS resource 1,2,3,4 |
| Density (ρ) |  | 3 for CSI-RS resource 1,2,3,4 |
| CSI-RS periodicity | slots | 20 for CSI-RS resource 1,2,3,4 |
| EPRE ratio to SSS | dB | -3Note 2 |
| TCI state |  | TCI.State.0 |
| Note: BW of TRS is configured same as the BW size of IAB-MT active BWP in the RRM test cases | | |

**Table G.1.10.1.2-2: CSI-RS for tracking for SCS=30kHz**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | TRS.1.2 TDD |
| Bandwidth |  | BW of Active BWPNote 1 |
| SCS | kHz | 30 |
| First subcarrier index in the PRB used for CSI-RS |  | k0=0 for CSI-RS resource 1,2,3,4 |
| First OFDM symbol in the slot used for CSI-RS |  | l0 = 5 for CSI-RS resource 1 and 3  l0 = 9 for CSI-RS resource 2 and 4 |
| Number of CSI-RS ports (X) |  | 1 for CSI-RS resource 1,2,3,4 |
| CDM Type |  | ‘No CDM’ for CSI-RS resource 1,2,3,4 |
| Density (ρ) |  | 3 for CSI-RS resource 1,2,3,4 |
| CSI-RS periodicity | slots | 40 for CSI-RS resource 1,2,3,4 |
| EPRE ratio to SSS | dB | -3Note 2 |
| TCI state |  | TCI.State.0 |
| Note 1: BW of TRS is configured same as the BW size of IAB-MT active BWP in the RRM test cases  Note 2: Unless otherwise specified in the test case | | |

G.1.10.2 Configuration of CSI-RS for tracking for FR2

G.1.10.2.1 TDD

**Table G.1.10.2.1-1: CSI-RS for tracking for SCS=120kHz Set 1**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | TRS.2.1 TDD |
| Bandwidth |  | BW of Active BWPNote 1,3 |
| SCS | kHz | 120 |
| First subcarrier index in the PRB used for CSI-RS |  | k0=0 for CSI-RS resource 1,2,3,4 |
| First OFDM symbol in the slot used for CSI-RS |  | l0 = 1 for CSI-RS resource 1 and 3  l0 = 5 for CSI-RS resource 2 and 4 |
| Number of CSI-RS ports (X) |  | 1 for CSI-RS resource 1,2,3,4 |
| CDM Type |  | ‘No CDM’ for CSI-RS resource 1,2,3,4 |
| Density (ρ) |  | 3 for CSI-RS resource 1,2,3,4 |
| CSI-RS periodicity | slots | 80 for CSI-RS resource 1,2,3,4 |
| EPRE ratio to SSS | dB | -3Note 2 |
| TCI state |  | TCI.State.0 |
| Note 1: BW of TRS is configured same as the BW size of IAB-MT active BWP in the RRM test cases  Note 2: Unless otherwise specified in the test case  Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active BWP size. | | |

**Table G.1.10.2.1-2: CSI-RS for tracking for SCS=120kHz Set 2**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | TRS.2.2 TDD |
| Bandwidth |  | BW of Active BWPNote 1,3 |
| SCS | kHz | 120 |
| First subcarrier index in the PRB used for CSI-RS |  | k0=0 for CSI-RS resource 1,2,3,4 |
| First OFDM symbol in the slot used for CSI-RS |  | l0 = 2 for CSI-RS resource 1 and 3  l0 = 6 for CSI-RS resource 2 and 4 |
| Number of CSI-RS ports (X) |  | 1 for CSI-RS resource 1,2,3,4 |
| CDM Type |  | ‘No CDM’ for CSI-RS resource 1,2,3,4 |
| Density (ρ) |  | 3 for CSI-RS resource 1,2,3,4 |
| CSI-RS periodicity | slots | 80 for CSI-RS resource 1,2,3,4 |
| EPRE ratio to SSS | dB | -3Note 2 |
| TCI state |  | TCI.State.1 |
| Note 1: BW of TRS is configured same as the BW size of IAB-MT active BWP in the RRM test cases  Note 2: Unless otherwise specified in the test case  Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active BWP size. | | |

G.2 IAB-MT RRM test cases

## G.2.1 RRC\_CONNECTED state mobility for IAB-MTs

### G.2.1.1 RRC Connection Mobility Control

#### G.2.1.1.1 RRC Re-establishment

G.2.1.1.1.1 Inter-frequency RRC Re-establishment in FR1 for LA IAB-MT

G.2.1.1.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR1 to an unknown target cell is within the specified limits. These tests will verify the requirements in clause 12.1.1.1. This test case is applicable only for local area IAB-MT and for IAB type 1-H.

The test parameters are given in table G.2.1.1.1.1.1-1, table G.2.1.1.1.1.1-2 and table G.2.1.1.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the IAB-MT shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the IAB-MT has the context of the carrier frequency of cell 2 by the end of T1.

**Table G.2.1.1.1.1.1-1: Supported test configurations**

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

**Table G.2.1.1.1.1.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Value** | **Comment** |
| Initial condition | Active cell |  | 1, 2 | Cell1 |  |
|  | Neighbour cells |  | 1, 2 | Cell2 |  |
| Final condition | Active cell |  | 1, 2 | Cell2 |  |
| RF Channel Number | |  | 1, 2 | 1, 2 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| N310 | | - | 1, 2 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2 | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 1, 2 | 30000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.2 FR1 |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
|  | | 2 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2 | OFF |  |
| PRACH configuration | |  | 1, 2 | FR1 PRACH configuration 1 | TBD |
| T1 | | s | 1, 2 | 20 |  |
| T2 | | ms | 1, 2 | 1000 | Time for the IAB-MT to detect RLF |
| T3 | | s | 1, 2 | 20 |  |

**Table G.2.1.1.1.1.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | | **Cell 2** | | | | |
|  |  |  | **T1** | | **T2** | **T3** | **T1** | **T2** | | | **T3** |
| RF Channel Number |  | 1, 2 | 1 | | | | 2 | | | | |
| TDD configuration |  | 1 | TDDConf.1.1 | | | | TDDConf.1.1 | | | | |
|  |  | 2 | TDDConf.2.1 | | | | TDDConf.2.1 | | | | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | | | N/A | | | | |
|  |  | 2 | SR.1.1 TDD | | | |  | | | | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 TDD | | | | CR.1.1 TDD | | | | |
|  |  | 2 | CR.2.1 TDD | | | | CR.2.1 TDD | | | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 TDD | | | | CCR.1.1 TDD | | | | |
|  |  | 2 | CCR.2.1 TDD | | | | CCR.2.1 TDD | | | | |
| OCNG Pattern |  | 1, 2 | OP.1 defined in TBD | | | | OP.1 defined in TBD | | | | |
| TRS configuration |  | 1 | TRS.1.1 TDD | | | | N/A | | | | |
|  |  | 2 | TRS.1.2 TDD | | | |  | | | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0 | | | | DLBWP.0 | | | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0 | | | | ULBWP.0 | | | | |
| Active DL BWP confgiuration |  | 1, 2 | DLBWP.1.1 | N/A | | N/A | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | N/A | | N/A | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | 1, 2 | SSB | | | | SSB | | | | |
|  | dB | 1, 2 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
| Note2 | dBm/SCS | 1 | -98 | | | | | | | | |
|  |  | 2 | -95 | | | | | | | | |
| Note2 | dBm/15 kHz | 1, 2 | -98 | | | | | | | | |
|  | dB | 1, 2 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
| SS-RSRP Note3 | dBm/SCS | 1 | -94 | | -infinity | -infinity | -infinity | -infinity | | | -91 |
|  |  | 2 | -91 | | -infinity | -infinity | -infinity | -infinity | | | -88 |
| Io | dBm/9.36 MHz | 1 | -64.59 | | -70. 05 | -70. 05 | -70. 05 | -70. 05 | | | -62.26 |
| dBm/38.16 MHz | 2 | -58.50 | | -63.94 | -63.94 | -63.94 | -63.94 | | | -56.15 |
| 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.  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. | | | | | | | | | | | |

G.2.1.1.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the IAB-MT starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 14.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 2

Tidentify\_intra\_NR = 6400 ms

Tidentify\_inter\_NR = 6400 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 14495 ms, allow 14.5 s in the test case.

G.2.1.1.1.2 Intra-frequency RRC Re-establishment in FR1 without serving cell timing for LA IAB-MT

G.2.1.1.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 12.1.1.1. This test case is applicable only for local area IAB-MT and for IAB type 1-H.

The test parameters are given in table G.2.1.1.1.2.1-1, table G.2.1.1.1.2.1-2 and table G.2.1.1.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table G.2.1.1.1.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 2 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The IAB-MT is only required to be tested in one of the supported test configurations. | |

**Table G.2.1.1.1.2.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Value** | **Comment** |
| Initial condition | Active cell |  | 1, 2 | Cell1 |  |
|  | Neighbour cells |  | 1, 2 | Cell2 |  |
| Final condition | Active cell |  | 1, 2 | Cell2 |  |
| RF Channel Number | |  | 1, 2 | 1, 2 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| N310 | | - | 1, 2 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2 | 6000 | Radio link failure timer configured by *RLF-TimersAndConstants* |
| T311 | | ms | 1, 2 | 15000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.2 FR1 |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
|  | | 2 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2 | OFF |  |
| PRACH configuration | |  | 1, 2 | FR1 PRACH configuration 1 | TBD |
| T1 | | s | 1, 2 | 10 |  |
| T2 | | s | 1, 2 | 7 | Time for the IAB-MT to detect RLF |
| T3 | | s | 1, 2 | 10 |  |

**Table G.2.1.1.1.2.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | | |
|  |  |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| TDD configuration |  | 1 | TDDConf.1.1 | | | TDDConf.1.1 | | |
|  |  | 2 | TDDConf.2.1 | | | TDDConf.2.1 | | |
| PDSCH RMC configuration |  | 1 | SR.1.1 TDD | | | N/A | | |
|  |  | 2 | SR.2.1 TDD | | |  | | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 TDD | | | CR.1.1 TDD | | |
|  |  | 2 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
|  |  | 2 | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| OCNG Pattern |  | 1, 2 | OP.1 defined in TBD | | | OP.1 defined in TBD | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2 | SSB | | | SSB | | |
|  | dB | 1, 2 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
| Note2 | dBm/SCS | 1 | -98 | | | | | |
|  |  | 2 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1, 2 | -98 | | | | | |
|  | dB | 1, 2 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
| SS-RSRP Note3 | dBm/SCS | 1 | -94 | -infinity | -infinity | -infinity | -infinity | -94 |
|  |  | 2 | -91 | -infinity | -infinity | -infinity | -infinity | -91 |
| Io | dBm/9.36 MHz | 1 | -64.59 | -infinity | -infinity | -infinity | -infinity | -64.59 |
|  | dBm/9.36 MHz | 2 | -58.50 | -infinity | -infinity | -infinity | -infinity | -58.50 |
| 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.  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. | | | | | | | | |

G.2.1.1.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the IAB-MT starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 8.1 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 1

Tidentify\_intra\_NR = 6400 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 8095 ms, allow 8.1 s in the test case.

G.2.1.1.1.3 Inter-frequency RRC Re-establishment in FR2 for LA IAB-MT

G.2.1.1.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 12.1.1.1. This test case is applicable only for local area IAB-MT and for IAB type 2-O.

The test parameters are given in table G.2.1.1.1.3.1-1, table G.2.1.1.1.3.1-2 and table G.2.1.1.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the IAB-MT shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the IAB-MT has the context of the carrier frequency of cell 2 by the end of T1.

**Table G.2.1.1.1.3.1-1: Supported test configurations**

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

**Table G.2.1.1.1.3.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Value** | **Comment** |
| Initial condition | Active cell |  | 1 | Cell1 |  |
|  | Neighbour cells |  | 1 | Cell2 |  |
| Final condition | Active cell |  | 1 | Cell2 |  |
| RF Channel Number | |  | 1 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| N310 | | - | 1 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1 | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 1 | 30000 | RRC re-establishment timer |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
|  | |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1 | OFF |  |
| PRACH configuration | |  | 1 | FR2 PRACH configuration 1 | Table TBD |
| T1 | | s | 1 | 10 |  |
| T2 | | ms | 1 | 4800 | Time for the IAB-MT to detect RLF |
| T3 | | s | 1 | 20 |  |

**Table G.2.1.1.1.3.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | | |
|  |  |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| AoA setup |  | 1 | Setup 2 as specified in clause G.1.8.2 | | | | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| OCNG Pattern |  | 1 | OP.1 defined in TBD | | | OP.1 defined in TBD | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 8 |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | |
| Note2 | dBm/SCS | 1 | -89 | | | | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 8 |
| SS-RSRP Note3 | dBm/SCS | 1 | -84 | -infinity | -infinity | -infinity | -infinity | -81 |
| Io | dBm/95.04 MHz | 1 | -53.82 | -infinity | -infinity | -infinity | -infinity | -51.37 |
| Propagation Condition |  | 1 | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void | | | | | | | | |

G.2.1.1.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the IAB-MT starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 18 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 2

Tidentify\_intra\_NR = 8000 ms

Tidentify\_inter\_NR = 8000 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 17695 ms, allow 18 s in the test case.

G.2.1.1.1.4 Intra-frequency RRC Re-establishment in FR2 without serving cell timing for LA IAB-MT

G.2.1.1.1.4.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 12.1.1.1. This test case is applicable only for local area IAB-MT and for IAB type 2-O.

The test parameters are given in table G.2.1.1.1.4.1-1, table G.2.1.1.1.4.1-2 and table G.2.1.1.1.4.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table G.2.1.1.1.4.1-1: Supported test configurations**

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

**Table G.2.1.1.1.4.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Value** | **Comment** |
| Initial condition | Active cell |  | 1 | Cell1 |  |
|  | Neighbour cells |  | 1 | Cell2 |  |
| Final condition | Active cell |  | 1 | Cell2 |  |
| RF Channel Number | |  | 1 | 1 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| N310 | | - | 1 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1 | 6000 | Radio link failure timer configured by *RLF-TimersAndConstants* |
| T311 | | ms | 1 | 30000 | RRC re-establishment timer |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1 | OFF |  |
| PRACH configuration | |  | 1 | FR2 PRACH configuration 1 | Table TBD |
| T1 | | s | 1 | 10 |  |
| T2 | | s | 1 | 10800 | Time for the IAB-MT to detect RLF |
| T3 | | s | 1 | 30 |  |

**Table G.2.1.1.1.4.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | | |
|  |  |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| AoA setup |  | 1 | Setup 2 as specified in clause G.1.8.2 | | | | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
|  |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 FDD | | | CR.3.1 FDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 FDD | | | CCR.3.1 FDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| TCI state |  | 1 | CSI-RS.Config.0 | | | N/A | | |
| OCNG Pattern |  | 1 | OP.1 defined in TBD | | | OP.1 defined in TBD | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| AoA setup |  | 1 | Setup 1 defined in TBD | | | Setup 1 defined in TBD | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| Note2 | dBm/SCS | 1 | -98 | | | | | |
| Note2 | dBm/15 kHz | 1 | -89 | | | | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -93 | -infinity | -infinity | -infinity | -infinity | -93 |
| Io | dBm/95.04 MHz | 1 | -62.82 | -infinity | -infinity | -infinity | -infinity | -62.82 |
| Propagation Condition |  | 1 | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void | | | | | | | | |

G.2.1.1.1.4.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the IAB-MT starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 30 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 1

Tidentify\_intra\_NR = 28160 ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 29855 ms, allow 30 s in the test case.

#### G.2.1.1.2 RRC Connection Release with Redirection

G.2.1.1.2.1 Redirection from NR in FR1 to NR in FR1

G.2.1.1.2.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 12.1.1.3.

G.2.1.1.2.1.2 Test Parameters

Supported test configurations are shown in table G.2.1.1.2.1.2-1. The time delay is tested by using the parameters in table G.2.1.1.2.1.2-2, and G.2.1.1.2.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the IAB-MT during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the IAB-MT. Prior to time duration T2, the IAB-MT shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

**Table G.2.1.1.2.1.2-1: Redirection from NR to NR test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | Source cell: NR 15 kHz SSB SCS, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, TDD duplex mode |
| 2 | Source cell: NR 30 kHz SSB SCS, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, TDD duplex mode |
| Note 1: The IAB-MT is only required to be tested in one of the supported test configurations | |

**Table G.2.1.1.2.1.2-2: General test parameters for Redirection from NR to NR test case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 | 8 |  |

**Table G.2.1.1.2.1.2-3: Cell specific test parameters for Redirection from NR to NR test case**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** | | | | **Cell 2** | | |
| **T1** | | **T2** | | **T1** | | **T2** |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| BWP BW | | Config 1 | MHz | DLBWP.1.1 | | | | | | |
| Config 2 | DLBWP.1.1 | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 TDD | | | | | | |
| Config 2 | SR 2.1 TDD | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 TDD | | | | | | |
| Config 2 | CR 2.1 TDD | | | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | | |
| SSB configration | | Config 1 |  | SSB.1 FR1 | | | | | | |
| Config 2 | SSB.2 FR1 | | | | | | |
| SMTC configuration | | Config 1 |  | SMTC.1 FR1 | | | | | | |
| Config 2 | SMTC.2 FR1 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 15 kHz | | | | | | |
| Config 2 | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 15 kHz | | | | | | |
| Config 2 | 30 kHz | | | | | | |
| BWP configuraiton | | 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 | | dBm/SCS | -98 | | | | | | |
| Config 2 | | -95 | | | | | | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
| IoNote3 | Config 1 | | dBm/  BW | Note3 | Note3 | | Note3 | | Note3 | |
| Config 2 | | dBm/  BW | Note3 | Note3 | | Note3 | | Note3 | |
| 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. | | | | | | | | | | |

G.2.1.1.2.1.3 Test Requirements

The IAB-MT shall start to transmit the PRACH to Cell 2 less than 7480 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR = TRRC\_procedure\_delay + Tidentify-NR + TSI-NR + TRACH,

where:

TRRC\_procedure\_delay = 110 ms in the test.

Tidentify-NR = 5440 ms in the test.

TSI-NR = 1280 ms, it is the time required for receiving all the relevant system information.

TRACH = 650 ms in the test.

This gives a total of 7480 ms.

G.2.1.1.2.2 Redirection from NR in FR2 to NR in FR2

G.2.1.1.2.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 12.1.1.3.

G.2.1.1.2.2.2 Test Parameters

Supported test configurations are shown in table G.2.1.1.2.2.2-1. The time delay is tested by using the parameters in table G.2.1.1.2.2.2-2, and G.2.1.1.2.2.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the IAB-MT during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the IAB-MT shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

**Table G.2.1.1.2.2.2-1: Redirection from NR to NR test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | Source cell: NR 120 kHz SSB SCS, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, TDD duplex mode |

**Table G.2.1.1.2.2.2-2: General test parameters for Redirection from NR to NR test case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 | 10 |  |

**Table G.2.1.1.2.2.2-3: Cell specific test parameters for Redirection from NR to NR test case**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** | | | | **Cell 2** | | |
| **T1** | | **T2** | | **T1** | | **T2** |
| AoA setup | | |  | 1 AoA as defined in G.1.8 | | | | | | |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| Duplex mode | | |  | TDD | | | | | | |
| BWP BW | | | MHz | DLBWP.1.1 | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | |  | SR3.1 TDD | | | | | | |
| CORESET Reference Channel | | |  | CR3.1 TDD | | | | | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | | | |
| SMTC configuration Note 6 | | |  | SMTC.1 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 120 kHz | | | | | | |
| TRS configuration | | |  | TRS.2.1 TDD | | | | | | |
| TCI configuration Note 6 | | |  | CSI-RS.Config.0 | | | | | | |
| BWP configuraiton | | 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 | | | 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 | | | |
| Note2 | Config 1 | | dBm/SCS | -95.7 | | | -95.7 | | | |
| Config 2 | | -95.7 | | | -95.7 | | | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
|  | | | dB | 5 | 5 | | -Infinity | | 5 | |
| IoNote3 | Config 1 | | dBm/  BW | Note3 | Note3 | | Note3 | | Note3 | |
| Config 2 | | dBm/  BW | Note3 | Note3 | | Note3 | | Note3 | |
| 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.  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 | | | | | | | | | | |

G.2.1.1.2.2.3 Test Requirements

The IAB-MT shall start to transmit the PRACH to Cell 2 less than 9080 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR = TRRC\_procedure\_delay + Tidentify-NR + TSI-NR + TRACH,

where:

TRRC\_procedure\_delay = 110 ms in the test.

Tidentify-NR = 7040 ms in the test.

TSI-NR = 1280 ms, it is the time required for receiving all the relevant system information.

TRACH = 650 ms in the test.

This gives a total of 9080 ms.

## G.2.2 Timing

### G.2.2.1 Transmit timing

G.2.2.1.1 NR IAB-MT Transmit Timing Test for FR1

G.2.2.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the IAB-MT can follow frame timing change of the connected gNodeb and that the IAB-MT initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 12.2.1.2. Local area IAB-MT type 1-H shall be tested with this test.

Supported test configurations are shown in Table G.2.2.1.1.1-1.

**Table G.2.2.1.1.1-1: Supported test configurations for FR1 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The IAB-MT is only required to be tested in one of the supported test configurations | |

For this test a single NR cell (Cell 1) is used. Table G.2.2.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the IAB-MT transmitting SRS using the configuration defined in Table G.2.2.1.1.1-3.

**Table G.2.2.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test1** |
| SSB ARFCN |  | 1,2,3 | 1 |
| TDD configuration |  | 1 | TDDConf.1.1 |
| 2 | TDDConf.1.2 |
| BWchannel | MHz | 1 | 10: NRB,c = 52 |
| 2 | 10: NRB,c = 52 |
| 3 | 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 |
| DRX Cycle | ms |  | N/A |
| PDSCH Reference measurement channel |  | 1 | SR.1.1 TDD |
| 2 | SR.2.1 TDD |
| RMSI CORESET Reference Channel |  | 1 | CR.1.1 TDD |
| 2 | CR.2.1 TDD |
| Dedicated CORESET Reference Channel |  | 1 | CCR.1.1 TDD |
| 2 | CCR.2.1 TDD |
| OCNG Patterns |  | 1,2,3 | OP.1 |
| SSB configuration |  | 1,2 | SSB.1 FR1 |
| 3 | SSB.2 FR1 |
| SMTC Configuration |  | 1,2 | SMTC.1 |
| 3 | SMTC.2 |
| TRS configuration |  | 1 | TRS.1.1 TDD |
|  | 2 | TRS.1.2 TDD |
| EPRE ratio of PSS to SSS | dB | 1,2,3 | 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/15 kHz | 1,2,3 | -98 |
| Note2 | dBm/SCS | 1,2 | -98 |
| 3 | -95 |
|  |  | 1,2,3 | 3 |
|  |  | 1,2,3 | 3 |
| SS-RSRPNote3 | dBm/SCS | 1,2 | -95 |
| 3 | -92 |
| IoNote3 | dBm/9.36MHz | 1,2 | -65.2 |
| dBm/38.1MHz | 3 | -59.2 |
| Propagation condition |  | 1,2,3 | AWGN |
| SRS Config |  | 1,2 | SRSConf.1Note5 |
|  | 3 | SRSConf.1Note5 |
| 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: 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.  Note 5: SRS configs are given in Table G.2.2.1.1.1-3 | | | |

**Table G.2.2.1.1.1-3: SRS Configuration for Timing Accuracy Test**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Field** | **SRSConf.1** | **Comments** |
| SRS-ResourceSet | srs-ResourceSetId | 0 |  |
| srs-ResourceIdList | 0 |  |
| resourceType | Periodic |  |
| Usage | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 |  |
| nrofSRS-Ports | Port1 |  |
| transmissionComb | n2 |  |
| combOffset-n2 | 0 |  |
| cyclicShift-n2 | 0 |  |
| resourceMapping  startPosition | 0 |  |
| resourceMapping  nrofSymbols | n1 |  |
| resourceMapping  repetitionFactor | n1 |  |
| freqDomainPosition | 0 |  |
| freqDomainShift | 0 |  |
| freqHopping  c-SRS | 14 for test configuration 1,2  25 for test configuration 3 | Matches NRB,c |
| freqHopping  b-SRS | 0 |  |
| freqHopping  b-hop | 0 |  |
| groupOrSequenceHopping | Neither |  |
| resourceType | Periodic |  |
| periodicityAndOffset-p | sl1, 0 |  |
| sequenceId | 0 | Any 10 bit number |

G.2.2.1.1.2 Test requirements

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test

1) Setup NR PCell according to parameters given in Table G.2.2.1.1.1-1.

2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within (NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SSB.

a. The NTA offset value (in Tc units) is 25600

b. The Te values depend on the DL and UL SCS for which the test is being run and are given in Table 12.2.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table G.2.2.1.1.2-1

**Table G.2.2.1.1.2-1: Adjustment Value for DL Timing**

|  |  |
| --- | --- |
| **SCS of SSB signals (KHz)** | **Adjustment Value** |
|  | Test1 |
| 15 | +64\*64Tc |
| 30 | +32\*64Tc |

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 12.2.1.2 Table 12.2.1.2.1-1 until the IAB-MT transmit timing offset is within (NTA + NTA\_offset) ×Tc ± Te respective to the first detected path (in time) of DL SSB.

5) The test system shall verify that the IAB-MT transmit timing offset stays within (NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SSB.

G.2.2.1.2 NR IAB-MT Transmit Timing Test for FR2

G.2.2.1.2.1 Test Purpose and environment

The purpose of this test is to verify that the IAB-MT can follow frame timing change of the connected gNodeb and that the IAB-MT initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 12.2.1.2. Local area IAB-MT type 2-O shall be tested with this test.

Supported test configurations are shown in Table G.2.2.1.2.1-1.

**Table G.2.2.1.2.1-1: Supported test configurations for FR2 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz |

For this test a single NR cell is used. Tables G.2.2.1.2.1-2 and Tables G.2.2.1.2.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the IAB-MT transmitting SRS using the configuration defined in Table G.2.2.1.2.1-3.

**Table G.2.2.1.2.1-2: Cell Specific Test Parameters for UL Transmit Timing test**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test1** | | **Test2** |
| SSB ARFCN |  | 1 | Freq1 | | Freq1 |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | |
| 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 | | |
| TCI State |  | 1 | CSI-RS.Config.0 | | |
| DRx Cycle | ms |  | N/A | | |
| 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 | | |
| OCNG Patterns |  | 1 | OP.1 | | |
| SSB Configuration |  | 1 | SSB.4 FR2 | | |
| SMTC Configuration |  | 1 | SMTC.1 | | |
| EPRE ratio of PSS to SSS | dB | 1 | 0 | | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  |
| Propagation condition |  | 1 | AWGN | | |
| SRS Config |  | 1 | SRSConf.1Note5 | SRSConf.2Note5 | |
| 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.  Note 5: SRS configs are given in Table G.2.2.1.2.1-3 | | | | | |

**Table G.2.2.1.2.1-2A: OTA related test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | **Test 2** |
| Angle of arrival configuration |  | Setup 1 according to clause G.1.8 | |
| Note1 | dBm/15kHzNote4 | -112 | |
| Note1 | dBm/SCSNote3 | -103 | |
|  | dB | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -99 | |
|  | dB | 4 | |
| IoNote2 | dBm/95.04 MHz Note4 | -68.5 | |
| 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: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone | | | |

**Table G.2.2.1.2.1-3: SRS Configuration for Timing Accuracy Test**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Field** | **SRSConf.1** | **SRSConf.2** | **Comments** |
| SRS-ResourceSet | srs-ResourceSetId | 0 | 0 |  |
|  | srs-ResourceIdList | 0 | 0 |  |
|  | resourceType | Periodic | Periodic |  |
|  | Usage | Codebook | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 | 0 |  |
|  | nrofSRS-Ports | Port1 | Port1 |  |
|  | transmissionComb | n2 | n2 |  |
|  | combOffset-n2 | 0 | 0 |  |
|  | cyclicShift-n2 | 0 | 0 |  |
|  | resourceMapping  startPosition | 0 | 0 |  |
|  | resourceMapping  nrofSymbols | n1 | n1 |  |
|  | resourceMapping  repetitionFactor | n1 | n1 |  |
|  | freqDomainPosition | 0 | 0 |  |
|  | freqDomainShift | 0 | 0 |  |
|  | freqHopping  c-SRS | 17 | 17 | Matches NRB,c |
|  | freqHopping  b-SRS | 0 | 0 |  |
|  | freqHopping  b-hop | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither |  |
|  | resourceType | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl1, 0 | sl2560, 4 |  |
|  | sequenceId | 0 | 0 | Any 10 bit number |

G.2.2.1.2.2 Test requirements

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test:

1) Setup NR PCell according to parameters given in Table G.2.2.1.2.1-1.

2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within (NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SSB.

a. The NTA offset value (in Tc units) is 13792

b. The Te values depend on the DL and UL SCS for which the test is being run and are given in Table 12.2.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table G.2.2.1.2.2-1

**Table G.2.2.1.2.2-1: Adjustment Value for DL Timing**

|  |  |  |
| --- | --- | --- |
| **SCS of SSB signals (kHz)** | **Adjustment Value** | |
|  | **Test1** | **Test2** |
| 240 | +8\*64Tc | +4\*64Tc |

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 12.2.1.2 Table 12.2.1.2.1-1 until the IAB-MT transmit timing offset is within (NTA + NTA\_offset) ×Tc ± Te respective to the first detected path (in time) of DL SSB.

5) The test system shall verify that the IAB-MT transmit timing offset stays within (NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SSB.

### ~~G.2.2.2 Timing advance~~

## G.2.3 Signalling Characteristics for IAB MTs

### G.2.3.1 Radio link Monitoring

G.2.3.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

G.2.3.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 12.3.1.

In the test, IAB-MT is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table G.2.3.1.1.1-1. The test parameters are given in Tables G.2.3.1.1-2 and G.2.3.1.1.1-3 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure G.2.3.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to Cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

**Table G.2.3.1.1.1-1: Supported test configurations for FR1 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The IAB-MT is only required to pass in one of the supported test configurations in FR1 | |

**Table G.2.3.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
|  | | |  | **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1,2 |  | TDD |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 |
|  | | Config 2 |  | 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 |  | TDDConf.1.1 |
| Config 2 |  | TDDConf.2.1 |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 TDD |
| Config 2 |  | CR.2.1 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR1 |
| Config 2 |  | SSB.2 FR1 |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| Config 2 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 15 kHz |
| Config 2 |  | 30 kHz |
| PRACH Configuration | | Config 1 |  | TBD |
| Config 2 |  | TBD |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| Out of sync 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 | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX | | |  | OFF |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.1.1 TDD |
| Config 2 |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1 |  | TRS.1.1 TDD |
| Config 2 |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 1.08 |
| T3 | | | s | 1.08 |
| D1 | | | s | 1.04 |
| Note 1: All configurations are assigned to the IAB-MT prior to the start of time period T1.  Note 2: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | | |

**Table G.2.3.1.1.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | |
|  | |  | **T1** | **T2** | **T3** |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| 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 on RLM-RS | Config 1 | dB | 1 | -7 | -15 |
|  | Config 2 | 1 | -7 | -15 |
|  | Config 3 | 1 | -7 | -15 |
| SNR on other channels and signals | Config 1, 2, 3 | dB | 1 | | |
|  | Config 1 | dBm/SCS | -98 | | |
| Config 2 | -95 | | |
| 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.  Note 2: The signal contains PDCCH for IAB-MTs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure G.2.3.1.1.1-1.  Note 5: The SNR values are specified for testing an IAB-MT which supports 2RX on at least one band. For testing of an IAB-MT which supports 4RX on all bands, the SNR during T3 is A.3.6 [6]. | | | | | |

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**Figure G.2.3.1.1.1-1: SNR variation for out-of-sync testing**

G.2.3.1.1.2 Test Requirements

The IAB-MT behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the IAB-MT shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The IAB-MT shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

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

G.2.3.1.2 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

G.2.3.1.2.2 Test Requirements

The IAB-MT behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the IAB-MT shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

G.2.3.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 12.3.1.

In the test, IAB-MT is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table G.2.3.1.2.1-1. The test parameters are given in Tables G.2.3.1.2.1-2, and G.2.3.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure G.2.3.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to Cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

**Table G.2.3.1.2.1-1: Supported test configurations for FR1 PCell**

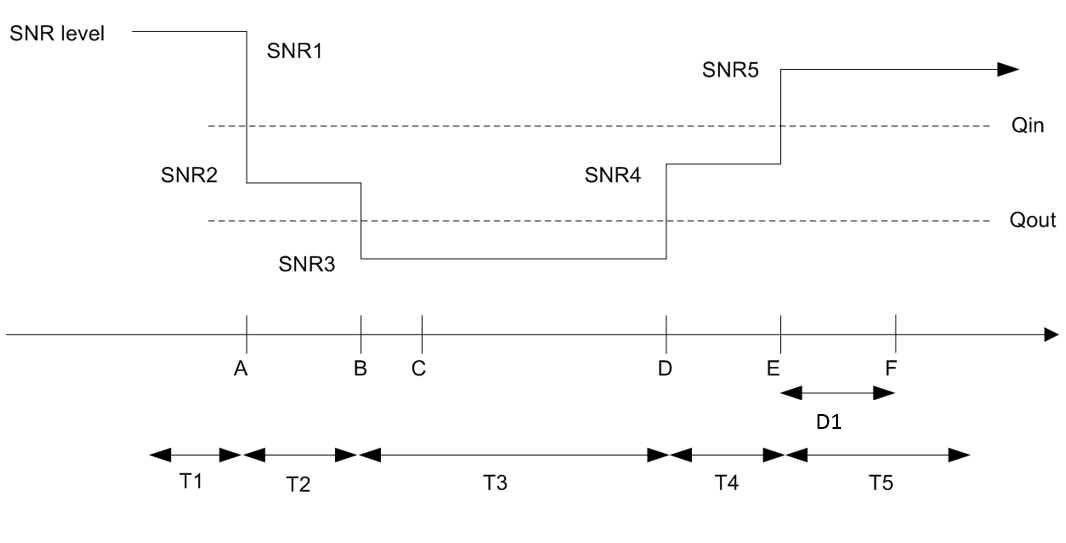
|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz |
| 2 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note: The IAB-MT is only required to pass in one of the supported test configurations in FR1 | |

**Table G.2.3.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** |
|  | | | |  | **Test 1** |
| Active PCell | | | |  | Cell 1 |
| RF Channel Number | | | |  | 1 |
| Duplex mode | | | Config 1, 2 |  | TDD |
| BWchannel | | | Config 1 | MHz | 10: NRB,c = 52 |
| Config 2 | 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 |  | TDDConf.1.1 |
| Config 2 |  | TDDConf.2.1 |
| CORESET Reference Channel | | | Config 1 |  | CR.1.1 TDD |
| Config 2 |  | CR.2.1 TDD |
| SSB Configuration | | | Config 1 |  | SSB.1 FR1 |
| Config 2 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1,2 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | | Config 1 |  | 15 kHz |
| Config 2 |  | 30 kHz |
| PRACH Configuration | | | Config 1 |  | TBD |
| Config 2 |  | TBD |
| SSB index assigned as RLM RS | | | |  | 0 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |
| In sync transmission parameters | DCI format | | |  | 1-0 |
| Number of Control OFDM symbols | | |  | 2 |
| Aggregation level | | | CCE | 4 |
| 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 |
| Out of sync 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 | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 4 |
| DMRS precoder granularity | | |  | REG bundle size |
| REG bundle size | | |  | 6 |
| DRX | | | |  | OFF |
| Layer 3 filtering | | | |  | *Enabled* |
| T310 timer | | | | ms | 1000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1 | |  | CSI-RS.1.1 TDD |
| Config 2 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1 | |  | TRS.1.1 TDD |
| Config 2 | |  | TRS.1.2 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 1.04 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 2.02 |
| D1 | | | | s | 1.98 |
| Note 1: All configurations are assigned to the IAB-MT prior to the start of time period T1.  Note 2: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | | | |

**Table G.2.3.1.2.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| 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 on RLM-RS | Config 1 | dB | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 2 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3 |  | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other channels and signals | Config 1, 2, 3 | dB | 1 |  |  |  |  |
|  | Config 1 | dBm/SCS | -98 | | | | |
| Config 2 | -95 | | | | |
| 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.  Note 2: The signal contains PDCCH for IAB-MTs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure G.2.3.1.2.1-1.  Note 5: The SNR values are specified for testing an IAB-MT which supports 2RX on at least one band. For testing of an IAB-MT which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6 [6]. | | | | | | | |

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**Figure G.2.3.1.2.1-1: SNR variation for in-sync testing**

G.2.3.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

G.2.3.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 12.3.1.

In the test, IAB-MT is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table G.2.3.1.3.1-1. The test parameters are given in Tables G.2.3.1.3.1-2 and G.2.3.1.3.1-3 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure G.2.3.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure G.2.3.1.3.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to Cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

**Table G.2.3.1.3.1-1: Supported test configurations for FR2 PCell**

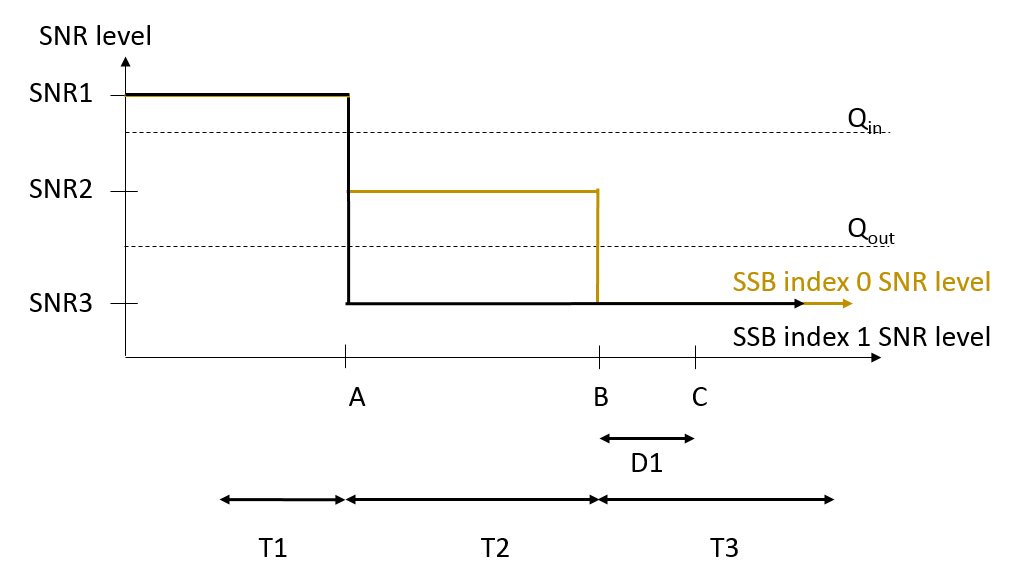
|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

**Table G.2.3.1.3.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.3.1 |
| CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | TBD |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.2 |
| CP length | | |  | Normal |
| Out of sync 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 | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX | | |  | OFF |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 4.88 |
| T3 | | | s | 4.88 |
| D1 | | | s | 4.84 |
| Note 1: All configurations are assigned to the IAB-MT prior to the start of time period T1.  Note 2: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | | |

**Table G.2.3.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| AoA setup | |  | Setup 2 as specified in clause G.1.8.2 | | | | | |
| **AoA1** | | | **AoA2** | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | Not sent | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| 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 |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 |
| ssb-Index 1 SNR | Config 1 |  | Not sent | | | 2Note 6 | -15 | -15 |
| SNR on other channels and signals | Config 1 | dB | 2Note 6 | | | N/A | | |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure G.2.3.1.3.1-2 | | | | | |
| 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 signal contains PDCCH for IAB-MTs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing an IAB-MT which supports 2RX on at least one band. For testing of a IAB-MT which supports 4RX on all bands, the SNR during T3 is A.3.6 [6].  Note 5: Void  Note 6: This value allows up to 1dB degradation from applied SNR to IAB-MT baseband | | | | | | | | |

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**Figure G.2.3.1.3.1-1: SNR variation for out-of-sync testing**

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**Figure G.2.3.1.3.1-2: Time multiplexed downlink transmissions**

G.2.3.1.3.2 Test Requirements

The IAB-MT behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the IAB-MT shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The IAB-MT shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

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

G.2.3.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

G.2.3.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 12.3.1.

In the test, IAB-MT is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table G.2.3.1.4.1-1. The test parameters are given in Tables G.2.3.1.4.1-2, and G.2.3.1.4.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure G.2.3.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure G.2.3.1.4.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to Cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

**Table G.2.3.1.4.1-1: Supported test configurations for FR2 PCell**

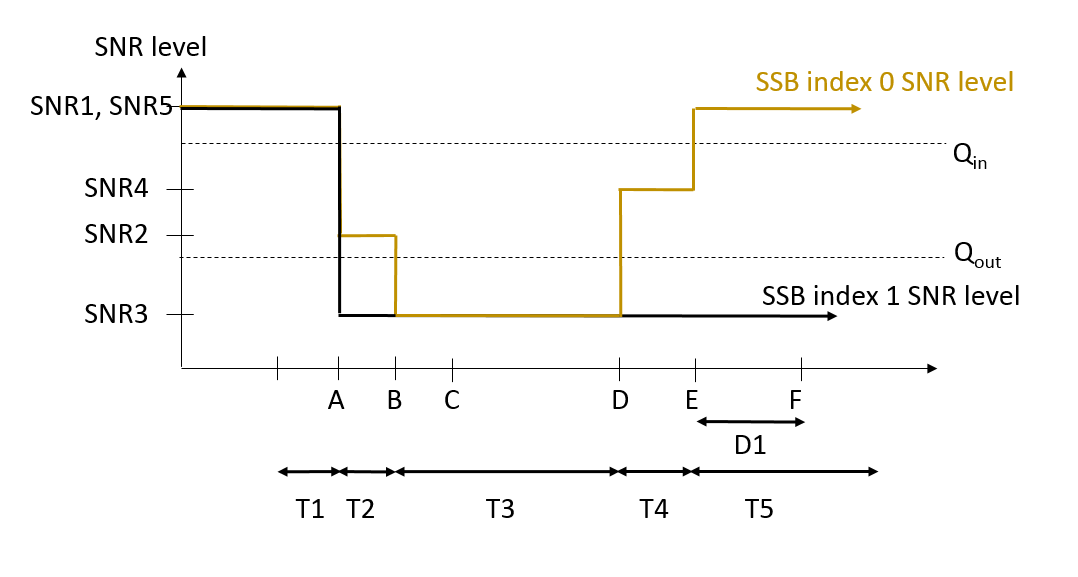
|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

**Table G.2.3.1.4.1-2: General test parameters for FR2 in-sync testing in non-DRX mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
|  | | |  | **Test 1** |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.3.1 |
| CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | TBD |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.2 |
| CP length | | |  | Normal |
| In sync transmission parameters | DCI format | |  | 1-0 |
| Number of Control OFDM symbols | |  | 2 |
| Aggregation level | | CCE | 4 |
| 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 |
| Out of sync 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 | 4 |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
| DMRS precoder granularity | |  | REG bundle size |
| REG bundle size | |  | 6 |
| DRX | | |  | OFF |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | 4000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 4.84 |
| T4 | | | s | 0.2 |
| T5 | | | s | 7.84 |
| D1 | | | s | 7.8 |
| Note 1: All configurations are assigned to the IAB-MT prior to the start of time period T1.  Note 2: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | | |

**Table G.2.3.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | | | | | | | | | | | | | | | |
|  | |  | **T1** | **T2** | | **T3** | | **T4** | | **T5** | | **T1** | | **T2** | | **T3** | | **T4** | | **T5** | |
| AoA setup | |  | Setup 2 as specified in clause G.1.8.2 | | | | | | | | | | | | | | | | | | |
|  | |  | **AoA1** | | | | | | | | | | **AoA2** | | | | | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | | | | | | | | Not sent | | | | | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |
| EPRE ratio of PBCH to PBCH DMRS | | dB |
| EPRE ratio of PSS to SSS | | dB |
| 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 |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | | -6Note 6 | | -15 | | -4.5 | | 2Note 6 | |
| ssb-Index 1 SNR | Config 1 |  | Not sent | | | | | | | | | | 2Note 6 | | -15 | | -15 | | -15 | | -15 |
| SNR on other channels and signals | Config 1 | dB | 2Note 6 | | | | | | | | | | N/A | | | | | | | | |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | | | | | | | | -92.1 | | | | | | | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure G.2.3.1.4.1-2 | | | | | | | | | | | | | | | | | | |
| 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 signal contains PDCCH for IAB-MTs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing an IAB-MT which supports 2RX on at least one band. For testing of a IAB-MT which supports 4RX on all bands, the SNR during T3 is A.3.6 [6].  Note 5: Void.  Note 6: This value allows up to 1dB degradation from applied SNR to IAB-MT baseband | | | | | | | | | | | | | | | | | | | | | |

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**Figure G.2.3.1.4.1-1: SNR variation for in-sync testing**

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**Figure G.2.3.1.4.1-2: Time multiplexed downlink transmissions**

G.2.3.1.4.2 Test Requirements

The IAB-MT behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the IAB-MT shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

G.2.3.1.5 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

G.2.3.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 12.3.1.3. This test case is applicable only for local area IAB-MT and for IAB type 1-H.

The test parameters are given in Tables G.2.3.1.5.1-1, G.2.3.1.5.1-2, G.2.3.1.5.1-3, and G.2.3.1.5.1-3A below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure G.2.3.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, SSB0 is configured as the BFD-RS.

**Table G.2.3.1.5.1-1: Supported test configurations for FR1 PCell**

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

**Table G.2.3.1.5.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in non-DRX**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **IAB-MT** |
|  | |  | **Test 1** |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1, 2 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.1.1 |
|  | Config 2 |  | TDDConf.2.1 |
| 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 |
| CORESET Reference Channel | Config 1 |  | CR.1.1 TDD |
|  | Config 2 |  | CR.2.1 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR1 |
|  | Config 2 |  | SSB.2 FR1 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
|  | Config 2 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 15 kHz |
|  | Config 2 |  | 30 kHz |
| TRS configuration | Config 1 |  | TRS.1.1 TDD |
|  | Config 2 |  | TRS.1.2 TDD |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.1.1 TDD |
|  | Config 2 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | |  | TCI.State.0 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low |
| Out of sync 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 | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *0* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.1.1 TDD |
|  | Config 2 |  | CSI-RS.2.1 TDD |
| T1 | | s | TBD |
| T2 | | s | TBD |
| T3 | | s | TBD |
| D1 | | s | TBD |
| Note 1: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | |

**Table G.2.3.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | |
|  | |  | **T1** | **T2** | **T3** |
| PDCCH\_beta | | dB | 4 | | |
| PDCCH\_DMRS\_beta | | dB | 4 | | |
| PBCH\_beta | | dB | 0 | | |
| PSS\_beta | | dB |  | | |
| SSS\_beta | | dB |  | | |
| PDSCH\_beta | | dB |  | | |
| OCNG\_beta | | dB |  | | |
| SNR on RLM-RS | Config 1, 2 | dB | 1 | -7 | -15 |
| SNR on other channels and signals | Config 1, 2 | dB | 1 | | |
|  | Config 1, 2 | dBm/15kHz | -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.  Note 2: The uplink resources for CSI reporting are assigned to the IAB-MT prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the IAB-MT prior to the start of time period T1.  Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 5: The signal contains PDCCH for IAB-MTs other than the device under test as part of OCNG.  Note 6: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 7: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure G.2.3.1.5.1-1.  Note 8: The SNR IAB-MTs are specified for testing a IAB-MT which supports 2RX on at least one band. For testing of IAB-MT which supports 4RX on all bands, the SNR during T3 is specified in clause G.1.3.1.1. | | | | | |

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**Figure G.2.3.1.5.1-1: SNR variation for CSI-RS out-of-sync testing**

G.2.3.1.5.2 Test Requirements

The IAB-MT behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the IAB-MT 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 IAB-MT shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The IAB-MT shall stop transmitting uplink signal in Cell 1 no later than time point C (D1 ms after the start of the time duration T3) on the PCell.

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

G.2.3.1.6 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

G.2.3.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 12.3.1.3. This test case is applicable only for local area IAB-MT and for IAB type 1-H.

The test parameters are given in Tables G.2.3.1.6.1-1, G.2.3.1.6.1-2, and G.2.3.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure G.2.3.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, SSB0 is configured as the BFD-RS.

**Table G.2.3.1.6.1-1: Supported test configurations for FR1 PCell**

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

**Table G.2.3.1.6.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **IAB-MT** |
|  | |  | **Test 1** |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1, 2 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.1.1 |
|  | Config 2 |  | TDDConf.2.1 |
| 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 |
| CORESET Reference Channel | Config 1 |  | CR.1.1 TDD |
|  | Config 2 |  | CR.2.1 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR1 |
|  | Config 2 |  | SSB.2 FR1 |
| SMTC Configuration | Config 1, 2 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 15 kHz |
| Config 2 |  | 30 kHz |
| TRS configuration | Config 1 |  | TRS.1.1 TDD |
|  | Config 2 |  | TRS.1.2 TDD |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.1.1 TDD |
|  | Config 2 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | |  | TCI.State.0 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low |
| Out of sync 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 | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| In sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 4 |
|  | 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 |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | 1000 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.1.1 TDD |
| Config 2 |  | CSI-RS.2.1 TDD |
| T1 | | s | TBD |
| T2 | | s | TBD |
| T3 | | s | TBD |
| T4 | | s | TBD |
| T5 | | s | TBD |
| T6 | | s | TBD |
| Note 1: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | |

**Table G.2.3.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| PDCCH\_beta | | dB | 4 | | | | |
| PDCCH\_DMRS\_beta | | dB | 4 | | | | |
| PBCH\_beta | | dB | 0 | | | | |
| PSS\_beta | | dB |  | | | | |
| SSS\_beta | | dB |  | | | | |
| PDSCH\_beta | | dB |  | | | | |
| OCNG\_beta | | dB |  | | | | |
| SNR on RLM-RS | Config 1, 2 | dB | 1 | -7 | -15 | -4.5 | 1 |
| SNR on other channels and signals | Config 1, 2 | dB | 1 | | | | |
|  | Config 1, 2 | dBm/15kHz | -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.  Note 2: The uplink resources for CSI reporting are assigned to the IAB-MT prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the IAB-MT prior to the start of time period T1.  Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 5: The signal contains PDCCH for IAB-MTs other than the device under test as part of OCNG.  Note 6: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 7: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure G.2.3.1.6.1-1.  Note 8: The SNR IAB-MTs are specified for testing a IAB-MT which supports 2RX on at least one band. For testing of IAB-MT which supports 4RX on all bands, the SNR during T3 is specified in clause G.1.3.1.1. | | | | | | | |

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**Figure G.2.3.1.6.1-1: SNR variation for CSI-RS in-sync testing**

G.2.3.1.6.2 Test Requirements

The IAB-MT behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the IAB-MT shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

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

#### G.2.3.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

##### G.2.3.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 12.3.1.3. This test case is applicable only for local area IAB-MT and for IAB type 2-0.

The test parameters are given in Tables G.2.3.1.7.1-1, G.2.3.1.7.1-2, G.2.3.1.7.1-3 and G.2.3.1.7.1-4 below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure G.2.3.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table G.2.3.1.7.1-1: Supported test configurations for FR2 PCell

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

Table G.2.3.1.7.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in non-DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | IAB-MT |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 |
| CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Out of sync 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 | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *0* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| T1 | | s | TBD |
| T2 | | s | TBD |
| T3 | | s | TBD |
| D1 | | s | TBD |
| Note 1: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | |

Table G.2.3.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | |  | AoA setup as defined in clause G.1.8 | | | | | |
|  | |  | **AoA1** | | | **AoA2** | | |
| Assumption for IAB-MT beamsNote 8 | |  | Rough | | | Rough | | |
| PDCCH\_beta | | dB | 4 | | | Not sent | | |
| PDCCH\_DMRS\_beta | | dB | 4 | | |  | | |
| PBCH\_beta | | dB | 0 | | |  | | |
| PSS\_beta | | dB |  | | |  | | |
| SSS\_beta | | dB |  | | |  | | |
| PDSCH\_beta | | dB |  | | |  | | |
| OCNG\_beta | | dB |  | | |  | | |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 9 | -6Note 9 | -15 |  | | |
| SNR on RLM-RS2 | Config 1 |  | Not sent | | | 2Note 9 | -14 | -15 |
| SNR on other channels and signals | Config 1 | dB | 2Note 9 | | | N/A | | |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| 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 IAB-MT prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the IAB-MT prior to the start of time period T1.  Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 5: The signal contains PDCCH for IAB-MTs other than the device under test as part of OCNG.  Note 6: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 7: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure G.2.3.1.7.1-1.  Note 8: Information about types of IAB-MT beam does not limit IAB-MT implementation or test system implementation.  Note 9: This IAB-MT allows up to 1dB degradation from applied SNR to IAB-MT baseband | | | | | | | | |

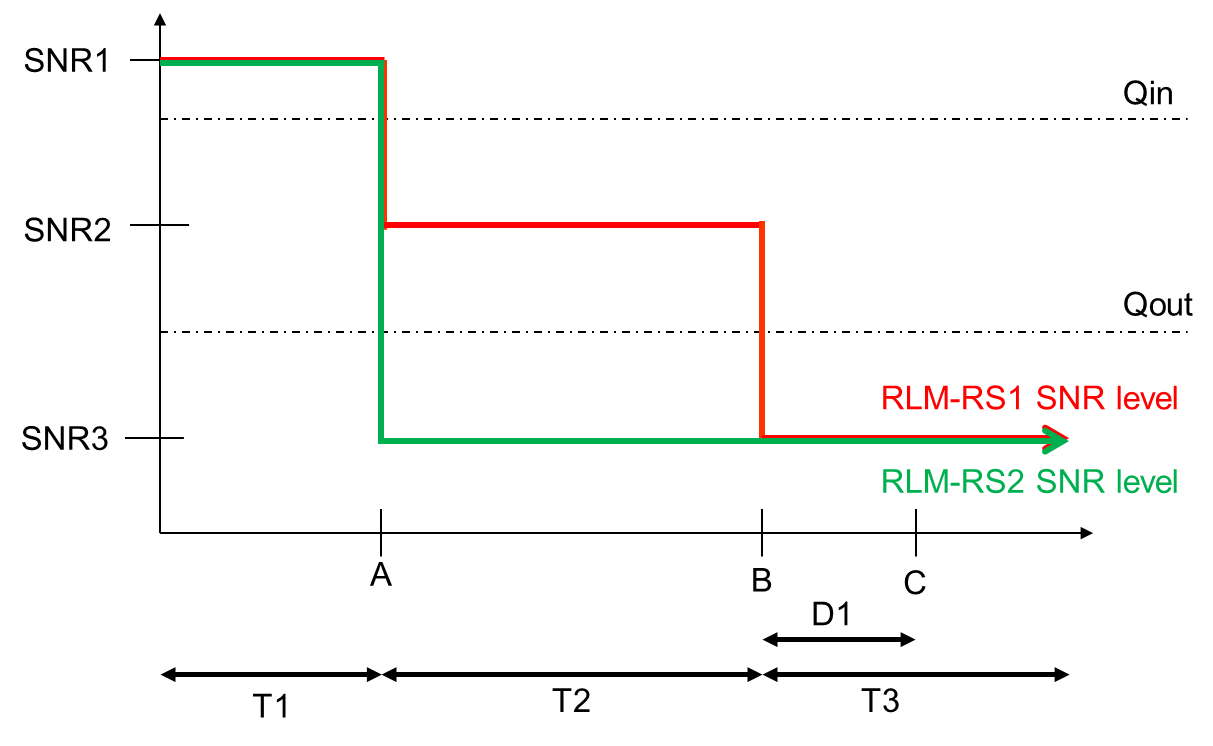
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Figure G.2.3.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

##### G.2.3.1.7.2 Test Requirements

The IAB-MT behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the IAB-MT 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 IAB-MT shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The IAB-MT shall stop transmitting uplink signal in Cell 1 no later than time point C (D1 second after the start of the time duration T3) on the PCell.

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

#### G.2.3.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

##### G.2.3.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 12.3.1.3. This test case is applicable only for local area IAB-MT and for IAB type 2-O.

The test parameters are given in Tables G.2.3.1.8.1-1, G.2.3.1.8.1-2 and G.2.3.1.8.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure G.2.3.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the IAB-MT shall be fully synchronized to cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table G.2.3.1.8.1-1: Supported test configurations for FR2 PCell

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

Table G.2.3.1.8.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | IAB-MT |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 |
| CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Out of sync 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 | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| In sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 4 |
|  | 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 |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | 1000 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| T1 | | s | TBD |
| T2 | | s | TBD |
| T3 | | s | TBD |
| T4 | | s | TBD |
| T5 | | s | TBD |
| D1 | | s | TBD |
| Note 1: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | |

Table G.2.3.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | AoA setup as defined in clause G.1.8 | | | | | | | | | |
|  | |  | **AoA1** | | | | | **AoA2** | | | | |
| Assumption for IAB-MT beamsNote 8 | |  | Rough | | | | | Rough | | | | |
| PDCCH\_beta | | dB | 4 | | | | | Not sent | | | | |
| PDCCH\_DMRS\_beta | | dB | 4 | | | | |  | | | | |
| PBCH\_beta | | dB | 0 | | | | |  | | | | |
| PSS\_beta | | dB |  | | | | |  | | | | |
| SSS\_beta | | dB |  | | | | |  | | | | |
| PDSCH\_beta | | dB |  | | | | |  | | | | |
| OCNG\_beta | | dB |  | | | | |  | | | | |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 9 | -6Note 9 | -15 | -4.5 | 2Note 9 |  | | | | |
| SNR on RLM-RS2 | Config 1 |  | Not sent | | | | | 2Note 9 | -14 | -15 | -15 | -14 |
| SNR on other channels and signals | Config 1 | dB | 2Note 10 | | | | | N/A | | | | |
|  | Config 1 | dBm/ 15KHz | -92.1 | | | | | -92.1 | | | | |
| 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 IAB-MT prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the IAB-MT prior to the start of time period T1.  Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 5: The signal contains PDCCH for IAB-MTs other than the device under test as part of OCNG.  Note 6: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 7: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure G.2.3.1.8.1-1.  Note 8: Information about types of IAB-MT beam does not limit IAB-MT implementation or test system implementation.  Note 9: This IAB-MT allows up to 1dB degradation from applied SNR to IAB-MT baseband. | | | | | | | | | | | | |

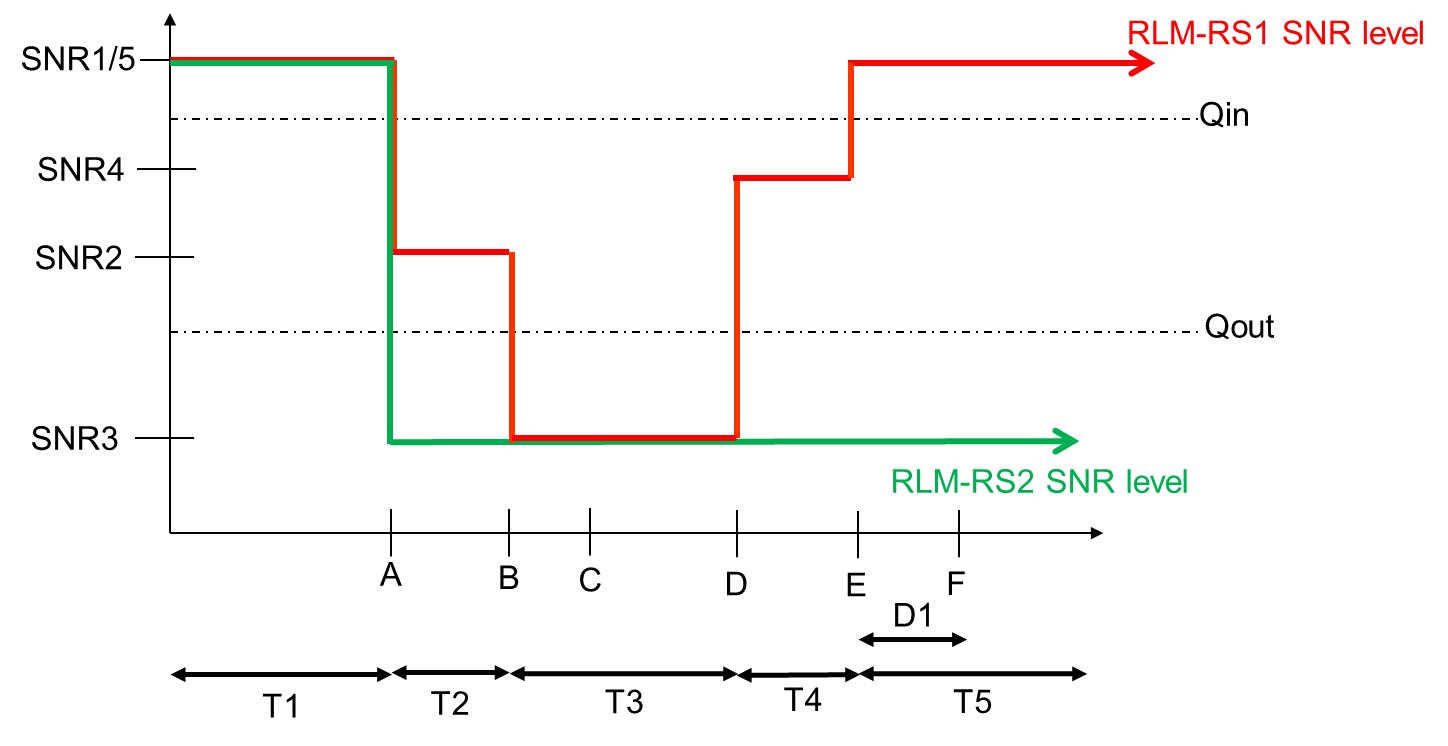
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Figure G.2.3.1.8.1-1: SNR variation for CSI-RS in-sync testing

##### G.2.3.1.8.2 Test Requirements

The IAB-MT behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the IAB-MT shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

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

### G.2.3.2 Beam Failure Detection and Link Recovery Procedure

#### G.2.3.2.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR

##### G.2.3.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects SSB-based beam failure in the set q0 configured for a serving cell and that the IAB-MT 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 IAB-MTs active DL BWP, during the evaluation period, and link recovery. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 12.3.2.

The test parameters are given in Tables G.2.3.2.1.1-1, G.2.3.2.1.1-2 and G.2.3.2.1.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure G.2.3.2.1.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure G.2.3.2.1.1-1 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 IAB-MT shall be fully synchronized to cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The IAB-MT is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

**Table G.2.3.2.1.1-1: Supported test configurations for FR1 PCell**

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

**Table G.2.3.2.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** | **Comment** |
|  | | | |  | **Test 1** |  |
| Active PSCell | | | |  | Cell 1 |  |
| RF Channel Number | | | |  | 1 |  |
| Duplex mode | | | Config 1, 2 |  | TDD |  |
| BWchannel | | | Config 1 | MHz | 10: NRB,c = 52 |  |
|  | | | Config 2 |  | 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 |  |
| CORESET Reference Channel | | | Config 1 |  | CR.1.1 TDD |  |
|  | | | Config 2 |  | CR.2.1 TDD |  |
| SSB Configuration | | | Config 1 |  | SSB.3 FR1 |  |
|  | | | Config 2 |  | SSB.4 FR1 |  |
| SMTC Configuration | | | Config 1 |  | SMTC.1 |  |
|  | | | Config 2 |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | Config 1 |  | 15 KHz |  |
|  | | | Config 2 |  | 30 KHz |  |
| PRACH Configuration | | | Config 1 |  | Table G.X |  |
|  | | | Config 2 |  | Table G.X |  |
| 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 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 |  |
| Gap pattern ID | | | |  | gp0 |  |
| gapOffset | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the IAB-MT applies the value 0. (Table 8.1.1-1 of TS 38.133). |
| rsrp-ThresholdSSB | | Config 1 | | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
|  | | Config 2 | |  | -95 |  |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see clause 5.17 of TS 38.321 [14] |
| beamFailureDetectionTimer | | | |  | pbfd4 | see clause 5.17 of TS 38.321 [14] |
| CSI-RS configuration for CSI reporting | Config 1 | | |  | CSI-RS.1.1 TDD |  |
|  | Config 2 | | |  | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | Config 1 | | |  | TRS.1.1 TDD |  |
|  | Config 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 IAB-MT 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 IAB-MT prior to the start of time period T1.  Note 2: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | | | | |

**Table G.2.3.2.1.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **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 |  | | | | |
| 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 | dB | 5 | -3 | -12 | -12 | -12 |
|  | Config 2 |  | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | -10 | -10 | 10 | 10 | 10 |
|  | Config 2 |  | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1 | dBm/SCS kHz | -108 | -108 | -88 | -88 | -88 |
|  | Config 2 |  | -105 | -105 | -85 | -85 | -85 |
|  | Config 1 | dBm/15 KHz | -98 | | | | |
|  | Config 2 |  | -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.  Note 2: The uplink resources for CSI reporting are assigned to the IAB-MT prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the IAB-MT prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the IAB-MT 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 IAB-MTs 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 G.2.3.2.1.1-1.  Note 9: The SNR values are specified for testing a IAB-MT which supports 2RX on at least one band. For testing of a IAB-MT which supports 4RX on all bands, the SNR during T3 is modified as specified in clause G.1.3. | | | | | | | |



**Figure G.2.3.2.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing**

##### G.2.3.2.1.2 Test Requirements

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

During the time duration T1 and T2, the IAB-MT 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 IAB-MT 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 IAB-MT shall detect beam failure and initiate link recovery. During T4 and T5 the IAB-MT 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 IAB-MT shall transmit preamble on a beam associated with the candidate beam set q1. The IAB-MT 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 IAB-MT. The rate of correct events observed during repeated tests shall be at least 90%.

#### G.2.3.2.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR

##### G.2.3.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects SSB-based beam failure in the set q0 configured for a serving cell and that the IAB-MT 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 IAB-MT active DL BWP, 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 FR2 serving cell requirements in clause 12.3.2.2.

The test parameters are given in Tables G.2.3.2.2.1-1, G.2.3.2.2.1-2, G.2.3.2.2.1-3 and G.2.3.2.2.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure G.2.3.2.X.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure G.2.3.2.2.1-1 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 IAB-MT shall be fully synchronized to cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. In the test, DRX configuration is not enabled.

Table G.2.3.2.2.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth |
| Note: The IAB-MT is only required to pass in one of the supported test configurations in FR2 | |

Table G.2.3.2.2.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Value | Comment |
| Test 1 |  |
| Active PCell | | | | |  | Cell 1 |  |
| RF Channel Number | | | | |  | 1 |  |
| Duplex mode | | Config 1, 2 | | |  | TDD |  |
| BWchannel | | Config 1, 2 | | |  | 100: NRB,c = 66 |  |
| 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 |  |
| CORESET Reference Channel | | Config 1, 2 | | |  | CR. 3.1 TDD |  |
| SSB Configuration | | Config 1 | | |  | SSB.1 FR2 |  |
|  | | Config 2 | | |  | SSB.2 FR2 |  |
| SMTC Configuration | | Config 1, 2 | | |  | SMTC.3 |  |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 | | |  | 120 KHz |  |
| SSB index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | | | |  | 1 |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| 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 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the IAB-MT applies the value 0. (Table 8.1.1-1 in TS 38.133 [6]). |
| rsrp- | | | Config 1 | | dBm/SSB | -94.5 | Threshold used |
| ThresholdSSB | | | Config 2 | | SCS | -91.5 | for Qin\_LR\_SSB |
| 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, 2 |  | CSI-RS.3.1 TDD |  |
| TCI states | | | | |  | TCI.State.0 |  |
| CSI-RS for tracking | | | | Config 1, 2 |  | TRS.2.1 TDD |  |
| SSB index assigned as RLM RS | | | | |  | 0, 1 |  |
| T310 Timer | | | | | ms | 1000 |  |
| N310 | | | | |  | 2 |  |
| T1 | | | | | s | 1 | During this time the the IAB-MT shall be fully synchronized to cell 1 |
| T2 | | | | | s | 2.61 |  |
| T3 | | | | | s | 1.64 |  |
| T4 | | | | | s | 0 |  |
| T5 | | | | | s | 1.01 |  |
| D1 | | | | | s | 0.97 |  |
| Note 1: All configurations are assigned to the IAB-MT prior to the start of time period T1.  Note 2: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | | | | | |

*Editor’s note: An additional RS for RLM, different from BFD-RS at constant high SNR shall be configured as part of the test configuration.*

Table G.2.3.2.2.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in G.1.18 | | | | |
| 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 |  | | | | |
| 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 | dB | 5 | -3 | -12 | -12 | -12 |
|  | Config 2 |  | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
|  | Config 2 |  | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/SSB | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 2 | SCS | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | Config 1 | dBm/120 KHz | -104.7 | | | | |
|  | Config 2 |  | -104.7 | | | | |
| Propagation condition | |  | 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 IAB-MT prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the IAB-MT 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 IAB-MTs 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 G.2.3.2.X.1-1.  Note 9: The SNR values are specified for testing an IAB-MT which supports 2RX on at least one band. For testing of an IAB-MT hich supports 4RX on all bands, the SNR during T3 is modified as specified in clause G.1.3. 1 | | | | | | | |

****

**Figure G.2.3.2.2.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### G.2.3.2.2.2 Test Requirements

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

During the time duration T1 and T2, the IAB-MT 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 IAB-MT 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 IAB-MT shall detect beam failure and initiate link recovery. During T4 and T5 the IAB-MT measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 560+650 ms after the start of T5, the IAB-MT shall transmit preamble on a beam associated with the candidate beam set q1. The IAB-MT 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 IAB-MT. The rate of correct events observed during repeated tests shall be at least 90%.

#### G.2.3.2.3 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR

##### G.2.3.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the IAB-MT performs correct CSI-RS-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the IAB-MTs active DL BWP, during the evaluation period, and link recovery. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 12.3.2.

The test parameters are given in Tables G.2.3.2.3.1-1, G.2.3.2.3.1-2 and G.2.3.2.3.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure G.2.3.2.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active cell to emulate CSI-RS based beam failure. Figure G.2.3.2.3.1-1 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 IAB-MT shall be fully synchronized to cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms.

**Table G.2.3.2.3.1-1: Supported test configurations for FR1 PCell**

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

**Table G.2.3.2.3.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** | **Comment** |
|  | | |  | **Test 1** |  |
| Active PCell | | |  | Cell 1 |  |
| RF Channel Number | | |  | 1 |  |
| Duplex mode | Config 1, 2 | |  | TDD |  |
| CORESET Reference Channel | Config 1 | |  | CR.1.1 TDD |  |
| Config 2 | |  | CR.2.1 TDD |  |
| SSB Configuration | Config 1 | |  | SSB.1 FR1 |  |
| Config 2 | |  | SSB.2 FR1 |  |
| SMTC Configuration | Config 1 | |  | SMTC.1 | G.1.6 |
| Config 2 | |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | Config 1 | |  | 15 KHz |  |
| Config 2 | |  | 30 KHz |  |
| csi-RS-Index assigned as beam failure detection RS in set q0 | | |  | 0 |  |
| OCNG parameters | | |  | OP.1 | G.1.2.1 |
| 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 |  |
| 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 IAB-MT applies the value 0. (Table 8.1.1-1of TS 38.133). |
| rsrp-ThresholdSSB | | Config 1 | dBm/SCS kHz | -98 | Threshold used for Qin\_LR\_SSB |
| Config 2 |  | -95 |  |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see clause 5.17 of TS 38.321 [14] |
| beamFailureDetectionTimer | | |  | pbfd4 | see clause 5.17 of TS 38.321 [14] |
| CSI-RS configuration for q0 and q1 | | Config 1 |  | CSI-RS.1.2 TDD |  |
|  | | Config 2 | CSI-RS.2.2 TDD |  |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.1.1 TDD |  |
|  | | Config 2 |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | Config 1 |  | TRS.1.1 TDD |  |
|  | | Config 2 |  | TRS.1.2 TDD |  |
| CSI-RS-Index assigned as RLM RS | | Config 1 |  | CSI-RS.1.2 TDD |  |
|  | | Config 2 |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 0.2 | During this time the the IAB-MT 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: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | | | |

**Table G.2.3.2.3.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **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 |  | | | | |
| 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 | -3 | -12 | -12 | -12 |
|  | Config 2 |  | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | -10 | -10 | 10 | 10 | 10 |
|  | Config 2 |  | -10 | -10 | 10 | 10 | 10 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS kHz | -108 | -108 | -88 | -88 | -88 |
|  | Config 2 |  | -105 | -105 | -85 | -85 | -85 |
|  | Config 1 | dBm/15 KHz | -98 | | | | |
|  | Config 2 |  | -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.  Note 2: The uplink resources for CSI reporting are assigned to the IAB-MT prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the IAB-MT 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 IAB-MTs 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 G.2.3.2.2.1-1.  Note 9: The SNR values are specified for testing a IAB-MT which supports 2RX on at least one band. For testing of a IAB-MT which supports 4RX on all bands, the SNR during T3 is modified as specified in clause G.1.3. | | | | | | | |



**Figure G.2.3.2.3.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing**

##### G.2.3.2.3.2 Test Requirements

The IAB-MT 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 IAB-MT 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 IAB-MT measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 30+10 ms after the start of T5, the IAB-MT shall transmit preamble on a beam associated with the candidate beam set q1. The IAB-MT 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 IAB-MT. The rate of correct events observed during repeated tests shall be at least 90%.

G.2.3.2.4 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

G.2.3.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the IAB-MT properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the IAB-MT performs correct CSI-RS-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the IAB-MT’s active DL BWP, 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 serving cell requirements in clause 12.3.2.

The test parameters are given in Tables G.2.3.2.4.1-1, G.2.3.2.4.1-2, and G.2.3.2.4.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure G.2.3.2.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active cell to emulate CSI-RS based beam failure. Figure G.2.3.2.4.1-1 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 IAB-MT shall be fully synchronized to cell 1. The IAB-MT shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled.

**Table G.2.3.2.4.1-1: Supported test configurations for FR2 PCell**

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

**Table G.2.3.2.4.1-2: General test parameters for FR2 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 |  | TDD |  |
| TDD Configuration | Config 1 |  | TBD |  |
| CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | G.1.1.2 |
| SSB Configuration | Config 1 |  | SSB.3 FR2 | G.1.5 |
| SMTC Configuration | Config 1 |  | SMTC.3 | G.1.6 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120KHz |  |
| csi-RS-Index assigned as beam failure detection RS in set q0 | |  | 0 |  |
| TRS configuration | |  | TRS.2.1 TDD | G.1.10.2 |
| TCI configuration | |  | TBD |  |
| OCNG parameters | |  | OP.1 | G.1.2.1 |
| CP length | |  | Normal |  |
| 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 |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | |  | absent | When the field is absent, the IAB-MT applies the value 0. (Table 8.1.1-1 in TS 38.133 [6]). |
| rsrp-ThresholdSSB | | dBm/SCS kHz | -94.5 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | |  | n1 | see clause 5.17 of TS 38.321 [14] |
| beamFailureDetectionTimer | |  | pbfd4 | see clause 5.17 of TS 38.321 [14] |
| CSI-RS configuration for q0 and q1 | Config 1 |  | CSI-RS.3.2 TDD | G.1.7.1 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD | G.1.7.1 |
| csi-RS-Index assigned as RLM RS | |  | 0, 1 | G.1.7.1 |
| T310 Timer | | ms | 1000 |  |
| N310 | |  | 2 |  |
| T1 | | s | 0.2 | During this time the the IAB-MT 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: IAB-MT-specific PDCCH is not transmitted after T1 starts. | | | | |

**Table G.2.3.2.4.1-3: Cell specific test parameters for FR2 PCell for CSI-RS based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 1 defined in G.1.8 | | | | |
| 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 |  | | | | |
| 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 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 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 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/15 KHz | -104.7 | | | | |
| Propagation condition | |  | 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 IAB-MT prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the IAB-MT 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 G.2.3.2.x.1-1.  Note 9: The SNR values are specified for testing an IAB-MT which supports 2RX on at least one band. For testing of an IAB-MT which supports 4RX on all bands, the SNR during T3 is modified as specified in clause G.1.3.2. | | | | | | | |



**Figure G.2.3.2.4.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode**

G.2.3.2.4.2 Test Requirements

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

During the time duration T1 and T2, the IAB-MT 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 IAB-MT 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 IAB-MT measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 30 +10 ms after the start of T5, the IAB-MT shall transmit preamble on a beam associated with the candidate beam set q1. The IAB-MT 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 IAB-MT. The rate of correct events observed during repeated tests shall be at least 90%.

G.3 Conditions for IAB-MT RRM requirements applicability for operating bands

G.3.1 Conditions for RRC\_CONNECTED state mobility for IAB-MT

G.3.1.1 Introduction

In Annex G.3.1, the following conditions are specified:

* IAB-MT conditions which shall apply for IAB-MT RRC Connection Re-establishment requirements for NR intra-frequency cells in clause 12.1.1.1 and
* IAB-MT conditions which shall apply for IAB-MT RRC Connection Re-establishment requirements for NR inter-frequency cells in clause 12.1.1.1 and
* IAB-MT conditions which shall apply for IAB-MT RRC Connection Release with Redirection requirements for NR cells in clause 12.1.1.3.

G.3.1.1.1 Conditions for Measurements on NR Intra-frequency Cells for RRC Connection Re-establishment

This clause defines the following conditions in terms of SSB\_RP and SSB Ês/Iot for measurements on NR intra-frequency cells for RRC connection re-establishment:

* The conditions are defined in Table G.3.1.1.1-1 for FR1 NR cells for Wide Area IAB-MT and IAB Type 1-H.
* The conditions are defined in Table G.3.1.1.1-2 for FR1 NR cells for Local Area IAB-MT and IAB Type 1-H.
* The conditions are defined in Table G.3.1.1.1-3 for FR1 NR cells for Wide Area IAB-MT and IAB Type 1-O.
* The conditions are defined in Table G.3.1.1.1-4 for FR1 NR cells for Local Area IAB-MT and IAB Type 1-O.
* The conditions are defined in Table G.3.1.1.1-5 for FR2 NR cells for Local Area and Wide Atea IAB-MT and IAB Type 2-O.

**Table G.3.1.1.1-1: Conditions for RRC connection re-establishment for intra-frequency cell for Wide Area IAB-MT and IAB Type 1-H**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -6 | -107 - 10\*Log10(NPRB \*12) |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -6 | -101.4- 10\*Log10(NPRB \*12) |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.1-2: Conditions for RRC connection re-establishment for intra-frequency cell for Local Area IAB-MT and IAB Type 1-H**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -6 | -99 - 10\*Log10(NPRB \*12) |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -6 | -92.5- 10\*Log10(NPRB \*12) |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.1-3: Conditions for RRC connection re-establishment for intra-frequency cell for Wide Area IAB-MT and IAB Type 1-O**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -6 | -107 - 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -6 | -101.4- 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.1-4: Conditions for RRC connection re-establishment for intra-frequency cell for Local Area IAB-MT and IAB Type 1-O**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -6 | -99 - 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -6 | -92.5- 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.1-5: Conditions for RRC connection re-establishment for intra-frequency cell for Local Area IAB-MT and IAB Type 2-O**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 50 | 120 | -6 | EISREFSENS\_50M - 10\*Log10(NPRB \*12) + ΔFR2\_REFSENS -5 |
| 100, 200, 400 | 120 | -6 | EISREFSENS\_50M - 10\*Log10(NPRB \*12) -2+ΔFR2\_REFSENS |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2.  NOTE 2: EISREFSENS\_50M for wide area IAB-MT and local area IAB-MT is defined in section 10.3.3.3. | | | |

G.3.1.1.2 Conditions for Measurements on NR Inter-frequency Cells for RRC Connection Re-establishment

This clause defines the following conditions in terms of SSB\_RP and SSB Ês/Iot for measurements on NR inter-frequency cells for RRC connection re-establishment:

* The conditions are defined in Table G.3.1.1.2-1 for FR1 NR cells for Wide Area IAB-MT and IAB Type 1-H.
* The conditions are defined in Table G.3.1.1.2-2 for FR1 NR cells for Local Area IAB-MT and IAB Type 1-H.
* The conditions are defined in Table G.3.1.1.2-3 for FR1 NR cells for Wide Area IAB-MT and IAB Type 1-O.
* The conditions are defined in Table G.3.1.1.2-4 for FR1 NR cells for Local Area IAB-MT and IAB Type 1-O.
* The conditions are defined in Table G.3.1.1.2-5 for FR2 NR cells for Local Area and Wide Atea IAB-MT and IAB Type 2-O.

**Table G.3.1.1.2-1: Conditions for RRC connection re-establishment for inter-frequency cell for Wide Area IAB-MT and IAB Type 1-H**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -4 | -105 - 10\*Log10(NPRB \*12) |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -4 | -99.4- 10\*Log10(NPRB \*12) |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.2-2: Conditions for RRC connection re-establishment for inter-frequency cell for Local Area IAB-MT and IAB Type 1-H**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -4 | -97 - 10\*Log10(NPRB \*12) |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -4 | -90.5- 10\*Log10(NPRB \*12) |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.2-3: Conditions for RRC connection re-establishment for inter-frequency cell for Wide Area IAB-MT and IAB Type 1-O**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -4 | -105 - 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -4 | -99.4- 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.2-4: Conditions for RRC connection re-establishment for inter-frequency cell for Local Area IAB-MT and IAB Type 1-O**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -4 | -97 - 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -4 | -90.5- 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.2-5: Conditions for RRC connection re-establishment for inter-frequency cell for Local Area IAB-MT and IAB Type 2-O**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 50 | 120 | -4 | EISREFSENS\_50M - 10\*Log10(NPRB \*12) + ΔFR2\_REFSENS - 3 |
| 100, 200, 400 | 120 | -4 | EISREFSENS\_50M - 10\*Log10(NPRB \*12) + ΔFR2\_REFSENS |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2.  NOTE 2: EISREFSENS\_50M for wide area IAB-MT and local area IAB-MT is defined in section 10.3.3.3. | | | |

G.3.1.1.3 Conditions for Measurements on NR Cells for RRC Connection Release with Redirection

This clause defines the following conditions in terms of SSB\_RP and SSB Ês/Iot for measurements on NR cells for RRC connection release with redirection:

* The conditions are defined in Table G.3.1.1.3-1 for FR1 NR cells for Wide Area IAB-MT and IAB Type 1-H.
* The conditions are defined in Table G.3.1.1.3-2 for FR1 NR cells for Local Area IAB-MT and IAB Type 1-H.
* The conditions are defined in Table G.3.1.1.3-3 for FR1 NR cells for Wide Area IAB-MT and IAB Type 1-O.
* The conditions are defined in Table G.3.1.1.3-4 for FR1 NR cells for Local Area IAB-MT and IAB Type 1-O.
* The conditions are defined in Table G.3.1.1.3-5 for FR2 NR cells for Local Area and Wide Atea IAB-MT and IAB Type 2-O.

**Table G.3.1.1.3-1: Conditions for RRC connection release with redirection for NR cell for Wide Area IAB-MT and IAB Type 1-H**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -4 | -105 - 10\*Log10(NPRB \*12) |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -4 | -99.4- 10\*Log10(NPRB \*12) |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.3-2: Conditions for RRC connection release with redirection for NR cell for Local Area IAB-MT and IAB Type 1-H**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -4 | -97 - 10\*Log10(NPRB \*12) |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -4 | -90.5- 10\*Log10(NPRB \*12) |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.3-3: Conditions for RRC connection release with redirection for NR cell for Wide Area IAB-MT and IAB Type 1-O**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -4 | -105 - 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -4 | -99.4- 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.3-4: Conditions for RRC connection release with redirection for NR cell for Local Area IAB-MT and IAB Type 1-O**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 10, 15 | 30 | -4 | -97 - 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | -4 | -90.5- 10\*Log10(NPRB \*12) - ΔOTAREFSENS |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2. | | | |

**Table G.3.1.1.3-5: Conditions for RRC connection release with redirection for NR cell for Local Area IAB-MT and IAB Type 2-O**

|  |  |  |  |
| --- | --- | --- | --- |
| **IAB-MT channel bandwidth (MHz)** | **SSB sub-carrier spacing (kHz)** | **Side conditions** | |
| **SSB Ês/Iot (dB)** | **Minimum SSB\_RP (dBm)** |
| 50 | 120 | -4 | EISREFSENS\_50M - 10\*Log10(NPRB \*12) + ΔFR2\_REFSENS - 3 |
| 100, 200, 400 | 120 | -4 | EISREFSENS\_50M - 10\*Log10(NPRB \*12) + ΔFR2\_REFSENS |
| NOTE 1: NPRB is the number of PRBs within the IAB-IMT channel bandwidth defined in section 5.3.2.  NOTE 2: EISREFSENS\_50M for wide area IAB-MT and local area IAB-MT is defined in section 10.3.3.3. | | | |

**----------------------END OF CHANGES----------------------------**