**3GPP TSG-RAN WG4 Meeting # 98-e R4-2103541**

**Electronic Meeting, Jan. 25-Feb. 5, 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **38.174** | **CR** | **Draft** | **rev** | **1** | **Current version:** | **16.1.0** |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | draftCR to introduce test configurations for IAB-MT RRM performance test |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_IAB-Perf |  | ***Date:*** | 2020-12-30 |
|  |  |  |  |  |
| ***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 canbe 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:*** | The test configuraitons for IAB-MT RRM performance testing is missing. |
|  |  |
| ***Summary of change:*** |  Introduce test configuraitons for IAB-MT RRM performance testing based on the agreed specification structures in R4-2017117 |
|  |  |
| ***Consequences if not approved:*** | The performance testing requirements are incomplete |
|  |  |
| ***Clauses affected:*** | Annex G |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ... |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

<Start of Change 1>

Annex G (normative): IAB-MT RRM Test Cases

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 blockNote 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.1.1.2.2-1: 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.1.1.2.2-2: 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.1.1.2.2-3: 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 configurationNote 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 |  | sl1600 | sl1600 | sl16080 |  |  |  |  |
| monitoringSymbolsWithinSlot |  | 11000000000000 | 00110000000000 | 11000000000000 |  |  |  |  |
| 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.1.2.1.2-2: 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 TS 38.104 [13].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 TS 38.104 [13].Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; 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 TS 38.104  [13].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 TS 38.104 [13].Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; 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 TS 38.104 [13].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 TS 38.104 [13].Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; 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 TS 38.104 [13]. 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 TS 38.104 [13].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 TS 38.104 [13]. 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 TS 38.104 [13]. 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 TS 38.104 [13]. 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 TS 38.104 [13]. 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 TS 38.104 [13]. 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 TS 38.104 [13]. 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 FR2Note 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 3l0 = 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 3l0 = 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 casesNote 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 3l0 = 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 casesNote 2: Unless otherwise specified in the test caseNote 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 3l0 = 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 casesNote 2: Unless otherwise specified in the test caseNote 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active BWP size. |

### <Start of Change 1>