**3GPP TSG-RAN WG4 Meeting #** **98-e R4-2103542**

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

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **38.174** | **CR** |  | **rev** | **1** | **Current version:** | **16.1.0** |  |
|  |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)*** *on using this form: comprehensive instructions can be found at <http://www.3gpp.org/Change-Requests>.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network |  |

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|  |
| ***Title:***  | [draft CR] Test cases for timing for IAB-MT |
|  |  |
| ***Source to WG:*** | ZTE Corporation |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_IAB-Perf |  | ***Date:*** | 2021-01-10 |
|  |  |  |  |  |
| ***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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | The test cases for timing of IAB-MTs in FR1 need to be specified in TS 38.174. |
|  |  |
| ***Summary of change:*** | Add the test case for timing of IAB-MTs in FR1 according to the corresponding core requirements in clause 12.2 in TS 38.174.A new Annex (G) is created for the test cases. G.1 is created for FR1 tests, under which G.2.2 is created for timing related tests. Content is added to G.2.2. |
|  |  |
| ***Consequences if not approved:*** | The test cases are missing from the specification and the functions of IAB-MTs cannot be guaranteed. |
|  |  |
| ***Clauses affected:*** | G.2.2 (new) |
|  |  |
|  | **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:*** | Revised from R4-2100046. |

*<start of the change 1>*

## G.2.2 Timing

### G.2.2.1 IAB-MT 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.0.1ULBWP.0.1 |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1ULBWP.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 |  |
| resourceMappingstartPosition | 0 |  |
| resourceMappingnrofSymbols  | n1 |  |
| resourceMappingrepetitionFactor | n1 |  |
| freqDomainPosition | 0 |  |
| freqDomainShift | 0 |  |
| freqHoppingc-SRS | 14 for test configuration 1,225 for test configuration 3 | Matches NRB,c |
| freqHoppingb-SRS | 0 |  |
| freqHoppingb-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.

*<end of the change 1>*