**3GPP TSG-RAN WG4 Meeting #111 R4-2407776**

Fukuoka City, Fukuoka , Japan, 20th – 24th May, 2024

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** |  | **Current version:** | **18.5.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | draft CR on test cases for FR2 UE transmit timing from two TRPs | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_MIMO\_evo\_DL\_UL-Perf | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 17) Rel-17 (Release 18) Rel-18 (Release 19) Rel-19 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduce RRM test cases for transmit timing requirements for FR2 UE supporting 2-TAs | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce RRM test cases for transmit timing requirements for FR2 UE supporting 2-TAs | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No test cases are defined. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.5.4.x; A.7.4.x | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of Change #1>

#### A.5.4.1.x NR UE Transmit Timing Test with 2-TA for FR2 UE supporting *multiDCI-IntraCellMultiTRP-TwoTA-r18*

##### A.5.4.1.x.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits, for UE supporting *multiDCI-IntraCellMultiTRP-TwoTA-r18* and is configured with 2 TAGs for multi-DCI multi-TRP operation. UE is also configured with *dl-OrJointTCI-StateList* or *ul*-*TCI-State-List*. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 5.4.1.x.1-1.

Table A.5.4.1.x.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz |

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Tables A.5.4.1.x.1-2 and A.5.4.1.x.1-2A define the parameters to be configured and strength of the transmitted signals. The NR PSCell is configured with two TRPs in the test. Each TRP is associated with a CORESET, with coresetPoolIndex-r16 is set to 0 for the first TRP and set to 1 for the second TRP. UE is also configured with tag2 in ServingCellConfig. Two SRS resource sets are configured and associated to different TAGs via TCI state configuration. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.5.4.1.x.1-3.

For UE not support the capability of “rxTimingDiff-r18”, the UE is only required to be tested in Test1 and Test3.

For UE supports the capability of “rxTimingDiff-r18”, the UE is only required to be tested in Test2 and Test4.

Table A.5.4.1.x.1-2: Cell Specific Test Parameters for UL Transmit Timing test

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test1 | | Test2 | | Test3 | | Test4 | | Band Group |
| TRP #1 | TRP #2 | TRP #1 | TRP #2 | TRP #1 | TRP #2 | TRP #1 | TRP #2 |
| SSB ARFCN |  | 1,2 | Freq1 | | | | | | | |  |
| Duplex Mode |  | 1,2 | TDD | | | | | | | |  |
| TDD configuration |  | 1,2 | TDDConf.3.1 | | | | | | | |  |
| BWchannel | MHz | 1,2 | 100: NRB,c = 66 | | | | | | | |  |
| Data RBs allocated |  | 1,2 | 66 | | | | | | | |  |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | | | | | | | |  |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | | | | | | | |  |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD  TRS.2.2 TDD | | | | | | | |  |
| DRx Cycle | ms | 1,2 | N/A | | | | DRX.8Note5 | | | |  |
| PDSCH Reference measurement channel |  | 1,2 | SR.3. 3 TDD | | | | | | | |  |
| RMSI CORESET Reference Channel |  | 1,2 | CR.3.1 TDD | | | | | | | |  |
| coresetPoolIndex for dedicated CORESET Reference Channel |  | 1,2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |  |
| Dedicated CORESET Reference Channel |  | 1,2 | CCR.3.4 TDD | CCR.3.6 TDD | CCR.3.4 TDD | CCR.3.6 TDD | CCR.3.4 TDD | CCR.3.6 TDD | CCR.3.4 TDD | CCR.3.6 TDD |  |
| TCI configuration |  | 1,2 | DLorJoint TCI.State.0 with tag-Id-ptr-r18 = n0 | DLorJoint TCI.State.1 with tag-Id-ptr-r18 = n1 | DLorJoint TCI.State.0 with tag-Id-ptr-r18 = n0 | DLorJoint TCI.State.1 with tag-Id-ptr-r18 = n1 | DLorJoint TCI.State.0 with tag-Id-ptr-r18 = n0 | DLorJoint TCI.State.1 with tag-Id-ptr-r18 = n1 | DLorJoint TCI.State.0 with tag-Id-ptr-r18 = n0 | DLorJoint TCI.State.1 with tag-Id-ptr-r18 = n1 |  |
| Timing difference compared to TRP#1 | us | 1,2 | 0 | 0.1 | 0 | 8 | 0 | 0.1 | 0 | 8 |  |
| OCNG Patterns |  | 1,2 | O P. 1 | | | | | | | |  |
| SSB Configuration |  | 1,2 | SSB.1 FR2 | | | | | | | |  |
| SMTC Configuration |  | 1,2 | SMTC.1 | | | | | | | |  |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 120 | | | | | | | |  |
| EPRE ratio of PSS to SSS | dB | 1,2 | 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 |  | 1,2 | AWGN | | | | | | | |  |
| SRS Config |  | 1,2 | SRSConf.1Note6 | | | | SRSConf.2Note6 | | | |  |
| 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: Void  Note 3: VoidNote 4: Void  Note 5: DRx related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.5.4.1.x.1-3 | | | | | | | | | | | |

Table A.5.4.1.x.1-2A: OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | Test 2 |
| Angle of arrival configuration |  | Setup 3 as specified in clause A.3.15 Note 7 | |
| Assumption for UE beamsNote 6 |  | Fine | |
| Note1 | dBm/15kHzNote4 | -112 | |
| Note1 | dBm/SCSNote3 | -100 | |
|  | dB | 4 | |
| SSB\_RPNote2 | 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  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  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 7: AoA1 for TRP1 and AoA2 for TRP2 | | | |

Table A.5.4.1.x.1-3: SRS Configuration for Timing Accuracy Test

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Field | SRSConf.1 | | SRSConf.2 | | Comments |
| SRS-ResourceSet | srs-ResourceSetId | 0 | 1 | 0 | 1 |  |
|  | srs-ResourceIdList | 0 | 1 | 0 | 1 |  |
|  | resourceType | Periodic | Periodic | Periodic | Periodic |  |
|  | Usage | Codebook | Codebook | Codebook | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 | 1 | 0 | 0 |  |
|  | nrofSRS-Ports | Port1 | Port1 | Port1 | Port1 |  |
|  | transmissionComb | n2 | n2 | n2 | n2 |  |
|  | combOffset-n2 | 0 | 0 | 0 | 0 |  |
|  | cyclicShift-n2 | 0 | 0 | 0 | 0 |  |
|  | resourceMapping  startPosition | 0 | 0 | 0 | 0 |  |
|  | resourceMapping  nrofSymbols | n1 | n1 | n1 | n1 |  |
|  | resourceMapping  repetitionFactor | n1 | n1 | n1 | n1 |  |
|  | freqDomainPosition | 0 | 0 | 0 | 0 |  |
|  | freqDomainShift | 0 | 0 | 0 | 0 |  |
|  | freqHopping  c-SRS | 17 | 17 | 17 | 17 | Matches NRB,c |
|  | freqHopping  b-SRS | 0 | 0 | 0 | 0 |  |
|  | freqHopping  b-hop | 0 | 0 | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither | Neither | Neither |  |
|  | resourceType | Periodic | Periodic | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl2, 0 | sl2, 1 | sl2560, 4 | sl2560, 9 | Offset to align with DRx periodicity |
|  | sequenceId | 0 | 0 | 0 | 0 | Any 10 bit number |
|  | TCI state | DLorJoint TCI.State.0 | DLorJoint TCI.State.1 | DLorJoint TCI.State.0 | DLorJoint TCI.State.1 |  |

Table A.5.4.1.x.1-4: Void

##### A.5.4.1.x.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) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.2-1 and setup NR PSCell according to parameters given in Table A.5.4.1.x.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 for each TAG.

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 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.5.4.1.x.2-1 for only TRP#1. The timing of the DL path of TRP#2 is not changed.

Table A.5.4.1.x.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 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (NTA + NTA\_offset) ×Tc ± Te respective to the first path (in time) of DL SSB of each TAG used by the UE to determine downlink timing is received from the reference cell at the UE antenna. For TRP#2, the test system shall verify there is no adjustment. Skip this step for Test 3 and Test 4 with DRX configured.

5) The test system shall verify that the UE transmit timing offset stays within (NTA + NTA\_offset) ×Tc ± Te of the first path (in time) of DL SSB of each TAG used by the UE to determine downlink timing is received from the reference cell at the UE antenna. For Test 3 and Test 4 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

<End of Change #1>

<Start of Change #2>

#### A.7.4.1.1 NR UE Transmit Timing Test with 2-TA for FR2 UE supporting *multiDCI-IntraCellMultiTRP-TwoTA-r18*

##### A.7.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits, for UE supporting *multiDCI-IntraCellMultiTRP-TwoTA-r18* and is configured with 2 TAGs for multi-DCI multi-TRP operation. UE is also configured with *dl-OrJointTCI-StateList* or *ul*-*TCI-State-List*. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 7.4.1.1.1-1.

Table A.7.4.1.1.1-1: 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 A.7.4.1.1.1-2 and A.7.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.4.1.1.1-3.

For UE not support the capability of “rxTimingDiff-r18”, the UE is only required to be tested in Test1 and Test3.

For UE supports the capability of “rxTimingDiff-r18”, the UE is only required to be tested in Test2 and Test4.

Table A.7.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test1 | | Test2 | | Test3 | | Test4 | | Band Group |
| TRP #1 | TRP #2 | TRP #1 | TRP #2 | TRP #1 | TRP #2 | TRP #1 | TRP #2 |
| SSB ARFCN |  | 1,2 | Freq1 | | | | | | | |  |
| Duplex Mode |  | 1,2 | TDD | | | | | | | |  |
| TDD configuration |  | 1,2 | TDDConf.3.1 | | | | | | | |  |
| BWchannel | MHz | 1,2 | 100: NRB,c = 66 | | | | | | | |  |
| Data RBs allocated |  | 1,2 | 66 | | | | | | | |  |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | | | | | | | |  |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | | | | | | | |  |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD  TRS.2.2 TDD | | | | | | | |  |
| DRx Cycle | ms | 1,2 | N/A | | | | DRX.8Note5 | | | |  |
| PDSCH Reference measurement channel |  | 1,2 | SR.3. 3 TDD | | | | | | | |  |
| RMSI CORESET Reference Channel |  | 1,2 | CR.3.2 TDD | | | | | | | |  |
| coresetPoolIndex for dedicated CORESET Reference Channel |  | 1,2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |  |
| Dedicated CORESET Reference Channel |  | 1,2 | CCR.3.4 TDD | CCR.3.6 TDD | CCR.3.4 TDD | CCR.3.6 TDD | CCR.3.4 TDD | CCR.3.6 TDD | CCR.3.4 TDD | CCR.3.6 TDD |  |
| TCI configuration |  | 1,2 | DLorJoint TCI.State.0 with tag-Id-ptr-r18 = n0 | DLorJoint TCI.State.1 with tag-Id-ptr-r18 = n1 | DLorJoint TCI.State.0 with tag-Id-ptr-r18 = n0 | DLorJoint TCI.State.1 with tag-Id-ptr-r18 = n1 | DLorJoint TCI.State.0 with tag-Id-ptr-r18 = n0 | DLorJoint TCI.State.1 with tag-Id-ptr-r18 = n1 | DLorJoint TCI.State.0 with tag-Id-ptr-r18 = n0 | DLorJoint TCI.State.1 with tag-Id-ptr-r18 = n1 |  |
| OCNG Patterns |  | 1,2 | O P. 1 | | | | | | | |  |
| SSB Configuration |  | 1,2 | SSB.1 FR2 | | | | | | | |  |
| SMTC Configuration |  | 1,2 | SMTC.1 | | | | | | | |  |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 120 | | | | | | | |  |
| EPRE ratio of PSS to SSS | dB | 1,2 | 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 |  | 1,2 | AWGN | | | | | | | |  |
| SRS Config |  | 1,2 | SRSConf.1Note6 | | | | SRSConf.2Note6 | | | |  |
| 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: Void  Note 3: VoidNote 4: Void  Note 5: DRx related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.5.4.1.x.1-3 | | | | | | | | | | | |

Table A.7.4.1.1.1-2A: OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | Test 2 |
| Angle of arrival configuration |  | Setup 3 as specified in clause A.3.15 Note 7 | |
| Assumption for UE beamsNote 6 |  | Fine | |
| Note1 | dBm/15kHzNote4 | -112 | |
| Note1 | dBm/SCSNote3 | -100 | |
|  | dB | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -96 | |
|  | 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 B\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  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  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 7: AoA1 for TRP1 and AoA2 for TRP2 | | | |

Table A.7.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Field | SRSConf.1 | | SRSConf.2 | | Comments |
| SRS-ResourceSet | srs-ResourceSetId | 0 | 1 | 0 | 1 |  |
|  | srs-ResourceIdList | 0 | 1 | 0 | 1 |  |
|  | resourceType | Periodic | Periodic | Periodic | Periodic |  |
|  | Usage | Codebook | Codebook | Codebook | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 | 1 | 0 | 0 |  |
|  | nrofSRS-Ports | Port1 | Port1 | Port1 | Port1 |  |
|  | transmissionComb | n2 | n2 | n2 | n2 |  |
|  | combOffset-n2 | 0 | 0 | 0 | 0 |  |
|  | cyclicShift-n2 | 0 | 0 | 0 | 0 |  |
|  | resourceMapping  startPosition | 0 | 0 | 0 | 0 |  |
|  | resourceMapping  nrofSymbols | n1 | n1 | n1 | n1 |  |
|  | resourceMapping  repetitionFactor | n1 | n1 | n1 | n1 |  |
|  | freqDomainPosition | 0 | 0 | 0 | 0 |  |
|  | freqDomainShift | 0 | 0 | 0 | 0 |  |
|  | freqHopping  c-SRS | 17 | 17 | 17 | 17 | Matches NRB,c |
|  | freqHopping  b-SRS | 0 | 0 | 0 | 0 |  |
|  | freqHopping  b-hop | 0 | 0 | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither | Neither | Neither |  |
|  | resourceType | Periodic | Periodic | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl2, 0 | sl2, 1 | sl2560, 4 | sl2560, 9 | Offset to align with DRx periodicity |
|  | sequenceId | 0 | 0 | 0 | 0 | Any 10 bit number |

Table A.7.4.1.1.1-4: Void

##### A.7.4.1.1.2 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 A.7.4.1.1.1-1.

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 for each TAG.

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 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.1.2-1 for only TRP#1. The timing of the DL path of TRP#2 is not changed.

Table A.7.4.1.1.2-1 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 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (NTA + NTA\_offset) ×Tc ± Te respective to the first path (in time) of DL SSB of each TAG used by the UE to determine downlink timing is received from the reference cell at the UE antenna. For TRP#2, the test system shall verify there is no adjustment. Skip this step for Test 3 and Test 4 with DRX confiured.

5) The test system shall verify that the UE transmit timing offset stays within (NTA + NTA\_offset) ×Tc ± Te of the first path (in time) of DL SSB used by the UE to determine downlink timing is received from the reference cell at the UE antenna. For Test 3 and Test 4 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

<End of Change #2>