3GPP TSG-RAN WG4 Meeting #113 R4-240xxxx

**Fukuoka, Japan, 20 May – 24 May 2024**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **xx** | **rev** | **1** | **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 to TS 38.133: TC for TDCP measurements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_FR2\_multiRX\_DL-Core | | | | |  | ***Date:*** | | | 2024-05-10 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)*  *Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | RAN4 agreed to introduce TDCP accuracy tests | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduction of TDCP accuracy test cases for NR SA and EN-DC | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | TDCP feature is not testable. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | (new) A.3.X, (new) 6.7.X, (new) 4.7.X | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **Y** |  | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2409721 | | | | | | | | |

<Start of Change #1>

Table A.3.17.1.X1-1: CSI-RS for tracking for SCS=15kHz

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | TRS.1.5 FDD |
| 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 |
| CSI-RS offset | slots | 10 for CSI-RS resource 1 and 2  11 for CSI-RS resource 3 and 4 |
| EPRE ratio to SSS | dB | 0Note 2 |
| TCI state |  | TCI.State.0 |
| Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases  Note 2: Unless otherwise specified in the test case | | |

Table A.3.17.1.X2-2: CSI-RS for tracking for SCS=30kHz

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | TRS.1.5 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 |
| CSI-RS offset | slots | 20 for CSI-RS resource 1 and 2  21 for CSI-RS resource 3 and 4 |
| EPRE ratio to SSS | dB | 0Note 2 |
| TCI state |  | TCI.State.0 |
| Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases  Note 2: Unless otherwise specified in the test case | | |

<End of Change #1>

<Start of Change #1>

#### A.6.7.X TDCP amplitude measurement accuracy

##### A.6.7.X.1 TDCP amplitude measurement accuracy in FR1

##### A.6.7. X.1.1 Test Purpose and Environment

The purpose of this test is to verify that the TRS based TDCP amplitude measurement accuracy is within the specified limits in the test requirements section. The cofigurations for the test are specified in Table A.6.7.X.1.1-1.

The test consists of two tests, Test 1 and Test 2. Each test further consists of two subtests Test 1A, 1B and Test 2A, 2B.

Test 1A: 10 Hz doppler + 15kHz SCS FDD + 20dB SNR

Test 1B: 10 Hz doppler + 30kHz SCS TDD + 20 dB SNR

Test 2A: 300 Hz doppler + 15kHz SCS FDD + [10] dB SNR

Test 2B: 300 Hz doppler + 30kHz SCS TDD + [10] dB SNR

Relevant parmeters for each test are provided in the table A.6.7.X.1.2-1. UE needs to pass Test 1A, 1B, 2A, 2B.

Table A.6.7.X.1.1-1: Applicable NR configurations for FR1 TRS based TDCP test

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

##### A.6.7. X.1.2 Test parameters

In this set of test cases there is one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.X.1.2-1. Ampliutude of TDCP is tested by using the parameters in Table A.6.7.X.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured with 1 TRS set with the TRS resources in the set are configured in adjacent slot. [UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.]

Table A.6.7.X.1.2-1: FR1 TRS based TDCP test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | Test 2 |
| SSB GSCN | 1~2 |  | freq1 | freq1 |
| Duplex mode | 1 |  | FDD | FDD |
|  | 2 |  | TDD | TDD |
| TDD Configuration | 1 |  | N/A | N/A |
|  | 2 |  | TDDConf.1.1 | TDDConf.1.1 |
| BWchannel | 1 | MHz | 10: NRB,c = 52 | 10: NRB,c = 52 |
|  | 2 |  | 40: NRB,c = 106 | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | SR.1.1 FDD |
|  | 2 |  | SR.2.1 TDD | SR.2.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | CR.1.1 FDD |
|  | 2 |  | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | CCR.1.1 FDD |
|  | 2 |  | CCR.2.1 TDD | CCR.2.1 TDD |
| SSB configuration | 1 |  | SSB.3 FR1 | SSB.3 FR1 |
|  | 2 |  | SSB.4 FR1 | SSB.4 FR1 |
| OCNG Patterns | 1~2 |  | OP.1 | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| TRS configuration | 1 |  | TRS.1.5 FDD | TRS.1.5 FDD |
|  | 2 |  | TRS.1.5 TDD | TRS.1.5 TDD |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.1  ULBWP.1.1 | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~2 |  | SMTC.1 | SMTC.1 |
| reportConfigType | 1~2 |  | periodic | periodic |
| reportQuantity | 1~2 |  | ssb-Index-RSRP | ssb-Index-RSRP |
| Number of reported RS | 1~2 |  | 2 | 2 |
| L1-RSRP reporting period | 1~2 |  | slot80 | slot80 |
| EPRE ratio of PSS to SSS | 1~2 | 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 DMRS |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |
| Noc | dBm/15kHz | 1 | -98 | -98 |
| 2 |
| Note 2 | dBm/SCS | 1 | -98 | -98 |
| 2 | -95 | -95 |
|  | 1~2 | dB | TBD | TBD |
|  | 1~2 | dB | 10 | 20 |
| SSB\_RP | 1 |  | -88 | -78 |
| Propagation condition | 1~2 |  | TDL-A 30ns 300 Hz | TDL-A 30ns 10 Hz |
| Antenna configuration | 1~2 |  | 1x2 | 1x2 |
| 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. | | | | |

##### A.6.7.X.1.3 Test Requirements

For Test 1A, the reported TDCP index shall be smaller than or equal to 6 for the 80% of the times over repeated tests

For Test 1B: the reported TDCP index shall be smaller than or equal to 5 for the 80% of the times over repeated tests

For Test 2A: the reported TDCP index shall be lrager than 8 for the 80% of the times over repeated tests

For Test 2B: the reported TDCP index shall be larger than [or equal to] 6 for the 80% of the times over repeated tests

<End of Change #2>

<Start of Change #3>

#### A.4.7.X TDCP amplitude measurement accuracy

##### A.4.7.X.1 TDCP amplitude measurement accuracy in EN-DC

##### A.4.7. X.1.1 Test Purpose and Environment

The purpose of this test is to verify that the TRS based TDCP amplitude measurement accuracy is within the specified limits in the test requirements section. The cofigurations for the test are specified in Table A.4.7.X.1.1-1.

The test consists of two tests, Test 1 and Test 2. Each test further consists of two subtests Test 1A, 1B and Test 2A, 2B.

Test 1A: 10 Hz doppler + 15kHz SCS FDD + 20dB SNR

Test 1B: 10 Hz doppler + 30kHz SCS TDD + 20 dB SNR

Test 2A: 300 Hz doppler + 15kHz SCS FDD + [10] dB SNR

Test 2B: 300 Hz doppler + 30kHz SCS TDD + [10] dB SNR

Relevant parmeters for each test are provided in the table A.4.7.X.1.2-1. UE needs to pass Test 1A, 1B, 2A, 2B.

Table A.4.7.X.1.1-1: Applicable NR configurations for FR1 TRS based TDCP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

##### A.4.7. X.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.X.1.2-1. Ampliutude of TDCP is tested by using the parameters in Table A.4.7.X.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured with 1 TRS set with the TRS resources in the set are configured in adjacent slot. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.4.7.X.1.2-1: FR1 TRS based TDCP test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | Test 2 |
| SSB GSCN | 1~2 |  | freq1 | freq1 |
| Duplex mode | 1 |  | FDD | FDD |
|  | 2 |  | TDD | TDD |
| TDD Configuration | 1 |  | N/A | N/A |
|  | 2 |  | TDDConf.1.1 | TDDConf.1.1 |
| BWchannel | 1 | MHz | 10: NRB,c = 52 | 10: NRB,c = 52 |
|  | 2 |  | 40: NRB,c = 106 | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | SR.1.1 FDD |
|  | 2 |  | SR.2.1 TDD | SR.2.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | CR.1.1 FDD |
|  | 2 |  | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | CCR.1.1 FDD |
|  | 2 |  | CCR.2.1 TDD | CCR.2.1 TDD |
| SSB configuration | 1 |  | SSB.3 FR1 | SSB.3 FR1 |
|  | 2 |  | SSB.4 FR1 | SSB.4 FR1 |
| OCNG Patterns | 1~2 |  | OP.1 | OP.1 |
| Initial BWP Configuration | 1~2 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| TRS configuration | 1 |  | TRS.1.5 FDD | TRS.1.5 FDD |
|  | 2 |  | TRS.1.5 TDD | TRS.1.5 TDD |
| Dedicated BWP configuration | 1~2 |  | DLBWP.1.1  ULBWP.1.1 | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~2 |  | SMTC.1 | SMTC.1 |
| reportConfigType | 1~2 |  | periodic | periodic |
| reportQuantity | 1~2 |  | ssb-Index-RSRP | ssb-Index-RSRP |
| Number of reported RS | 1~2 |  | 2 | 2 |
| L1-RSRP reporting period | 1~2 |  | slot80 | slot80 |
| EPRE ratio of PSS to SSS | 1~2 | 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 DMRS |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |
| Noc | dBm/15kHz | 1 | -98 | -98 |
| 2 |
| Note 2 | dBm/SCS | 1 | -98 | -98 |
| 2 | -95 | -95 |
|  | 1~2 | dB | TBD | TBD |
|  | 1~2 | dB | 10 | 20 |
| SSB\_RP | 1 |  | -88 | -78 |
| Propagation condition | 1~2 |  | TDL-A 30ns 300 Hz | TDL-A 30ns 10 Hz |
| Antenna configuration | 1~2 |  | 1x2 | 1x2 |
| 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. | | | | |

##### A.4.7. X.1.3 Test Requirements

For Test 1A, the reported TDCP index shall be smaller than or equal to 6 for the 80% of the times over repeated tests.

For Test 1B: the reported TDCP index shall be smaller than or equal to 5 for the 80% of the times over repeated tests.

For Test 2A: the reported TDCP index shall be lrager than 8 for the 80% of the times over repeated tests.

For Test 2B: the reported TDCP index shall be larger than [or equal to] 6 for the 80% of the times over repeated tests.

<End of Change #3>