**3GPP TSG-RAN WG4 Meeting #111 *R4-2408688***

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

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **DRAFT** | **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 for TC for mRx s-DCI DCI-based TCI state switch and related configurations | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_FR2\_multiRx\_DL-Perf | | | | |  | ***Date:*** | | | 2024-05-13 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | Multi-Rx test cases are missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introducing test case for sDCI DCI based TCI state switch delay for the case:   * RS1 to {RS1,RS2}   Additionally, introducing new AoA setups for: 2 AoAs and 3 AoAs  Revision 1:   * Adding OTA parameters that were missing from the original draft. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Test cases and related configurations remain missing | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2408688 | | | | | | | | |

**<< Start of Change #1 >>**

#### A.7.5.8.x Single-DCI FR2 DCI based active TCI state switch with known target TCI states for simultaneous reception

A.7.5.8.x.1 Test Purpose and Environment

The purpose of this test is to verify the DCI based active TCI state switch delay requirement defined for sDCI in clause 8.10E.4 for simultaneous reception in DL, while also verifying that the UE can complete active TCI state list update within the delay requirement defined in 8.10E.6. Supported test configuration is shown in Table A.7.5.8.X.1-1.

The test scenario comprises of one NR PCell (Cell 1) in FR2-1 as given in Table A.7.5.8.x.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.x.1-3 below. The OTA related test parameters for FR2 are shown in TableA.7.5.8.x.1-4.

PDCCH indicating new transmissions shall be sent continuously on PCell to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE is configured with 3 different TCI states for PCell in Cell 1 before starting the test:

- PDCCH TCI state 0 (QCL’d to SSB0),

- PDSCH TCI state 0 (QCL’d to SSB0),

- PDSCH TCI state 1 (QCL’d to SSB1)

- UE is indicated TCI state 0 as the active PDCCH and PDSCH TCI state and at the beginning of the test.

- TCI state 1, which is one of the target TCI states, is not in the active TCI state list.

The test consists of two time periods, T1 and T2.

During T1, only SSBs to which PDCCH TCI state 0 and PDSCH TCI state 0 are QCL’d is transmitted (SSB0).

At the beginning of T2, the SSB corresponding to PDSCH TCI state 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for SSB1, UE receives a MAC-CE command indicating activation of TCI state 0 and TCI state 1 in a single codepoint. *Tci-PresentInDCI* is configured as enabled in the PDSCH configuration.

After a time that equals to the active TCI state list update delay defined in section 8.10F.6 for sDCI, UE receives a DCI indicating TCI state 0 and TCI state 1 for PDSCH scheduling. The TE verifies that the UE can start receiving PDSCH with TCI state 0 and TCI state 1 simultaneously after *timeDurationForQCL* from receiving the DCI.

Table A.7.5.8.x.1-1: Supported test configurations

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

Table A.7.5.8.x.1-2: General test parameters for TCI state switch

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| T1 | s | 0.2 |  |
| T2 | s | 2 |  |

Table A.7.5.8.x.1-3: NR Cell specific test parameters for TCI state switch

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 1 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Data RBs allocated |  | 24 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3. 2 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP. 5 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| TCI State 0 |  | TCI. State.2 |
| TCI State 1 |  | TCI.State.3 |
| TRS Configuration |  | TRS.2.1 TDD  TRS.2.2 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| EPRE ratio of PSS to SSS | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.7.5.8.x.1-4: OTA related test parameters for TCI state switch

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
|  |  | SSB0 | | SSB1 | | |
|  |  | T1 | T2 | T1 | | T2 |
| Angle of arrival configuration |  | Setup TBD according to clause A.3.15.3 | | | | |
|  |  | AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 |  | Rough | | | | |
| Ês | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| SS B\_RP Note 2 | dBm/ SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| BB Note 7 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| IoNote2 | dBm/95.04 MHz Note4 | -55.41 | -55.41 | - Infinity | | -55.41 |
| Note 1: Void  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 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the center 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: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

A.7.5.8.x.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for SSB0 and SSB1.

After receiving DCI indicating TCI state 0 and TCI state 1 for PDSCH in slot n, UE shall be able to start receiving TCI state 0 and TCI state 1 simultaneously after n + *timeDurationForQCL.*

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

**<< End of changes >>**