3GPP TSG-RAN WG4 Meeting #97-e R4-2017177

Electronic Meeting, 2 Nov. – 13 Nov., 2020

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **DraftCR** | **rev** | **1** | **Current version:** | **16.5.0** |  |
|  | | | | | | | | |
| *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 on spatial relation switch test case | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Mediatek Inc. | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RRM\_Enh-Perf | | | | |  | ***Date:*** | | | 2020-10-14 |
|  |  | | | |  | |  | | |  |
| ***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 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The E-UTRAN – NR PSCell FR2 uplink spatial relation switch for a known spatial relation test case is missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add the new test case for E-UTRAN – NR PSCell FR2 uplink spatial relation switch for a known spatial relation. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The specification is incomplete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.3.x, A.5.5.x | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS/TR ... CR ... 38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

Start of Change 1

## A.3.x Spatial Relation Configuration

### A.3.x.1 Introduction

This clause provides the configurations for spatial relation towards either SSB or CSI-RS. The spatial relation defined in this clause are configured in each test when applicable to indicate spatial setting for certain UL signals with the referenceSignal configured in the spatial relation.

### A.3.x.2 Spatial Relation

**Table A.3.x.2-1: PUCCH Spatial Relation**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **PUCCH.SRI.0** | **PUCCH.SRI.1** |
| pucch-SpatialRelationInfoId | Id0 | Id1 |
| referenceSignal | SSB0 | SSB1 |
| Note 1: referenceSignal configurations towards which the spatial relation are configured in a test-specific manner. | | |

**Table A.3.x.2-2: SRS Spatial Relation**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **SRS.SRI0** | **SRS.SRI1** |
| srs-SpatialRelationInfoId | Id0 | Id1 |
| referenceSignal | SSB0 | SSB1 |
| Note 1: referenceSignal configurations towards which the spatial relation are configured in a test-specific manner. | | |

End of Change 1

Start of Change 2

### A.5.5.x Uplink spatial relation switch delay

#### A.5.5.x.1 MAC-CE based uplink spatial relation switch

##### A.5.5.x.1.1 E-UTRAN – NR PSCell FR2 uplink spatial relation switch for a known spatial relation

###### A.5.5.x.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the uplink spatial relation switch delay requirement defined in clause 8.12.3 by a UE capable of beam correspondence without the need for UL beam sweeping. Supported test configurations are shown in Table A.5.5.x.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.x.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.x.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.x.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have continuous ACK/NACK sending by PUCCH.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).

- UE is configured with 2 different spatial relations for PSCell, PUCCH spatial relation 0 (QCL’d to SSB0) and spatial relation 1 (QCL’d to SSB1), in Cell 2 before starting the test.

- UE is indicated in spatial relation 0 as the active PUCCH spatial relation

The test consists of two time periods, T1 and T2. During T1 only SSB to which PUCCH spatial relation 0 QCLed is transmitted. At the beginning of T2, the SSB corresponding to spatial relation 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to transmit PUCCH with spatial relation 1.

The test equipment verifies that UE can be scheduled on PSCell on spatial relation 0 till *n* + THARQ/NR slot length + . The test equipment also verifies the spatial relation switch time in PSCell by scheduling the UE on spatial relation 1 from slot *n* + THARQ/NR slot length + + 1 and onwards.

Table A.5.5.x.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.x.1.1.1-2: General test parameters for spatial relation switch

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | For both PCell and PSCell |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| L1-RSRP reporting period | slot | 160 | Periodic L1-RSRP reporting configured |
| L1-RSRP measured RS |  | SSB0, SSB1 | L1-RSRP measurements of SSB0 and SSB1. |
| Number of reported RS |  | 2 | L1-RSRP reporting of measurements on SSB0 and SSB1. |
| T1 | s | 0.2 |  |
| T2 | s | 2 |  |

Table A.5.5.8.1.1.1-3: NR Cell specific test parameters for spatial relation switch

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 2 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| 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.3.1 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.1 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| Spatial Relation 0 |  | PUCCH.  SRI.0 |
| Spatial Relation 1 |  | PUCCH.  SRI.1 |
| TRS Configuration |  | TRS.2.1 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 both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.5.5.8.1.1.1-4: OTA related test parameters for uplink spatial relation switch

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | | |
| SSB0 | | SSB1 | |
| T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | |
| AoA1 | | AoA2 | |
| NocNote 1 | dBm/15 kHz | -92.1 | | | |
| NocNote 1 | dBm/SCS | -83.1 | | | |
| Ês/Noc | dB | 1 | 1 | -Infinity | 1 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -82.1 | -82.1 | -Infinity | -82.1 |
| IoNote2,Note6 | dBm/95.04 MHz Note4 | -50.6 | -50.6 | -54.1 | -50.6 |
| 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 Noc to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  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. | | | | | |

###### A.5.5.8.1.1.2 Test Requirements

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

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to transmit PUCCH on spatial relation 0 till n+ THARQ/NR slot length + ;

- be able to start transmitting PUCCH on spatial relation 1 from slot n+ THARQ/NR slot length + +1.

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

End of Change 2