**3GPP TSG- Meeting #97-e *R4-2017179***

**, Noveember 02 – 13, 2020**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  |
| *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:***  |  |
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| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
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| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***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 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | During email discussions following the RAN4#96e meeting it was proposed that four test cases are to be introduced for verifying the spatial relation switching functionality. This CR covers *TC 3: MAC-CE based spatial relation switch associated with a known  DL-RS in SA*. |
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| ***Summary of change:*** | Introducing the following:* Clause A.7.5.X with TC 3: MAC-CE based spatial relation switch associated with a known  DL-RS in SA.
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| ***Consequences if not approved:*** | Functionality pertaing to MAC CE-triggered spatial relation switching for UE in stand-alone NR network connection will not be validated, hence performance cannot be guaranteed. |
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| ***Clauses affected:*** | A.7.5.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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Rev.1: Updated after alignment with other test cases for spatial relation switching. |

Unchanged Sections Omitted

First Modification

A.7.5.X Spatial Relation switch delay

A.7.5.X.1 MAC-CE based Spatial Relation switch

A.7.5.X.1.1 NR PCell FR2 spatial relation associated with known DL-RS

A.7.5.X.1.1.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of 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. The supported test configurations are shown in Table A.7.5.X.1.1.1-1.

The test scenario comprises one PCell (Cell 1) as outlined in Table A.7.5.X.1.1.1-2. Cell-specific parameters are provided in Table A.7.5.X.1.1.1-3. OTA-related test parameters are provided in Table A.7.5.X.1.1.1-4.

Throughout the test, PDCCH indicating new transmissions shall ge sent continuously on PCell to ensure that the UE will send ACK/NACKs on PUCCH.

Before the test starts,

* UE is connected to Cell 1 on radio channel 1.
* UE is configured with a single TCI state, TCI State-0, which is QCLed with SSB0.
* UE is configured with two spatial relation information configurations Spatial Relation Info-0 and Spatial Relation Info-1 for PUCCH, each associated with SSB0 and SSB1, respectively.
* UE is indicated via MAC-CE activation of *PUCCH-SpatialRelationInfoId* corresponding to Spatial Relation Info-0
* UE is configured with a CSI measurement configuration indicating L1-RSRP measurements on SSB0 and SSB1 with periodic reporting. The L1-RSRP measurement period is influenced by the following: the higher layer parameter *timeRestrictionForChannelMeasurement* is configured, measured SSBs are fully overlapping with SMTC window, and there are no conflicts with measurement gaps.

The test consists of two time periods, T1 and T2. During T1 only the SSB associated with PDCCH TCI state-0 and PUCCH Spatial Relation Info-0 is transmitted. At the beginning of T2, transmission of the SSB associated with PUCCH Spatial Relation Info-1 starts. The UE conducts periodic L1-RSRP measurements and *SSB-Index-RSRP* reporting for SSB0 and SSB1. In slot *n*, and after having reported valid results for both SSB0 and SSB1, the UE receives a MAC-CE indicating a switch of spatial relation to PUCCH Spatial Relation Info 1.

The test equipment verifies that the UE transmits according to PUCCH Spatial Relation Info 0 up until slot *n* + THARQ/NR slot length + $3N\_{slot}^{subframe,µ}$, and according to PUCCH Spatial Relation Info 1 from slot *n* + THARQ/NR slot length + $3N\_{slot}^{subframe,µ}$ + 1 and onwards.

**Table A.7.5.X.1.1.1-1: Supported test configurations**

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

**Table A.7.5.X.1.1.1-2: General test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |
| 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.7.5.X.1.1.1-3: NR Cell specific test parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** |
| 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  |
| TCI State-0 Configuration |  | TCI.State.0 |
| TRS Configuration |  | TRS.2.1 TDD  |
| Spatial Relation Info-0 Configuration |  | PUCCH.SRI.0 |
| Spatial Relation Info-1 Configuration |  | PUCCH.SRI.1 |
| 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 SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRSNote 1 |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |

**Table A.7.5.X.1.1.1-4: OTA related test parameters**

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| --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** |
| **SSB0** | **SSB1** |
| **T1** | **T2** | **T1** | **T2** |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 |
| AoA1 | AoA2 |
| Assumption for UE beams Note 6 |  | Rough |
| NocNote 1 | dBm/15 kHz | -92.1 |
| NocNote 1 | dBm/SCS | -83.1 |
| Ês/Noc | dB | 1 | -infinity | 1 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -82.1 | -infinity | -82.1 |
| IoNote2 | dBm/95.04 MHz Note4 | -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 zoneNote 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.7.5.X.1.1.2 Test Requirements

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

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

* Continue transmitting using PUCCH spatial relation associated with SSB0 up to and including slot *n* + THARQ/NR slot length + $3N\_{slot}^{subframe,µ}$
* Start transmitting using PUCCH spatial relation associated with SSB1 from slot *n* + THARQ/NR slot length + $3N\_{slot}^{subframe,µ}$ + 1 and onwards.

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

End of FIRST Modification

Unchanged Sections Omitted