**3GPP TSG- RAN4 Meeting #** **104-e *R4-22XXXXX***

**Electronic Meeting, August 15 – August 26, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **-** | **rev** | **-** | **Current version:** | **17.6.0** |  |
|  | | | | | | | | |
| *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:*** | Big CR for MR-DC enh RRM (Rel-17) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MCC, Huawei | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_NR\_DC\_enh2-Perf | | | | |  | ***Date:*** | | | 2022-8-30 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This big CR merge the endorese draft CRs for performance part of R17 in RAN4#104-e meetings.   * R4-2212982 (Huawei): Introduce Aperiodic CSI-RS for SCell activation configurtion for fast SCell activation delay. * R4-2211901 (Apple): Introduce test case for fast SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle. * R4-2212420 (MTK): Introducing test case for Fast SCell Activation of known SCell in FR1 for 640 ms SCell measurement cycle in EN-DC * R4-2212984 (Huawei): Introduce the following test cases for fast SCell activation delay:   A.5 EN-DC tests with NR cell in FR2   * A.5.5.3.X1 Fast SCell Activation of SCell in FR2 intra-band   A.6 NR standalone tests with NR cell in FR1   * A.6.5.3.X1 Fast SCell Activation of known SCell in FR1 in non-DRX for 160ms SCell measurement cycle * A.6.5.3.X2 Fast SCell Activation of known SCell in FR1 in non-DRX for 640 ms SCell measurement cycle   A.7 NR standalone tests with NR cell in FR2   * A.7.5.3.X1 Fast SCell Activation for SCell in FR2 intra-band * A.7.5.3.X2 Fast SCell Activation for SCell in FR2 inter-band * R4-2214937 (OPPO): Introduce the test case for SCG activation/deactivation for EN-DC with NR cell in FR1. * R4-2212155 (Intel): Introduce the test requirements for the interruption due to RRM measurements and RLM/BFD configured on the deactivated PSCell when under EN-DC. * R4-2214604 (Nokia): Introduction Test for PSCell activation and deactivation delay for PSCell RACH-less based Activation and deactivation for FR1+FR2 inter-band with target PSCell in FR2. * R4-2214988 (Huawei): Introduce Test case for efficient activation/de-activation mechanism for one SCG test:   A.5 EN-DC tests with NR cell in FR2   * A.5.5.X1 PSCell activation and deactivation delay * R4-2212986(Huawei): Introduce test for conditional PSCell addition delay requirements in FR2 EN-DC. * R4-2213020 (vivo): Introduce the test cases on conditional addition and release delay of PSCell in FR1 EN-DC. * R4-2213021(vivo): Introduce the test cases on conditional addition and release delay of PSCell in FR2 SA. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The test configuration and test cases for R17 further Multi-RAT Dual-Connectivity enhancements are specified. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No R17 further Multi-RAT Dual-Connectivity enhancements related performance requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.3.17.1, A.3.17.2;  New A.4.5.2.X1, New A.4.5.2.X2, New A.4.5.2.X3, New A.4.5.X4, New A.4.5.X5;  New A.5.5.3.X1, New A.5.5.X2, New A.5.5.X3;  New A.6.5.3.X1, New A.6.5.3.X2;  New A.7.5.3.X1, New A.7.5.3.X2; New A.7.5.X3; New A.7.5.X4. | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS38.533 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of Change 1>

### A.3.17.1 Configuration of CSI-RS for tracking for FR1

#### A.3.17.1.1 FDD

Table A.3.17.1.1-1: CSI-RS for tracking for SCS=15kHz

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | TRS.1.1 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.3.17.1.1-2: CSI-RS for tracking for SCS=30kHz

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | TRS.1.2 FDD |
| 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 | | |

Table A.3.17.1.1-3: Aperiodic CSI-RS for tracking for SCS=15kHz

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | TRS.1.3 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 |
| aperiodicTriggeringOffsetL2 | slots | 2 |
| Aperiodic CSI-RS offset | slots | 2 for CSI-RS resource 1 and 2  3 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.3.17.1.1-4: Aperiodic CSI-RS for tracking for SCS=30kHz

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | TRS.1.4 FDD |
| 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 |
| aperiodicTriggeringOffsetL2 | slots | 2 |
| Aperiodic CSI-RS offset | slots | 2 for CSI-RS resource 1 and 2  3 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 | | |

#### A.3.17.1.2 TDD

Table A.3.17.1.2-1: CSI-RS for tracking for SCS=15kHz

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | TRS.1.1 TDD |
| 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: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases | | |

Table A.3.17.1.2-2: CSI-RS for tracking for SCS=30kHz

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | TRS.1.2 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 | | |

Table A.3.17.1.2-3: Aperiodic CSI-RS for tracking for SCS=15kHz

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | TRS.1.3 TDD |
| 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 |
| aperiodicTriggeringOffsetL2 | slots | 2 |
| Aperiodic CSI-RS offset | slots | 2 for CSI-RS resource 1 and 2  3 for CSI-RS resource 3 and 4 |
| EPRE ratio to SSS | dB | 0Note 2 |
| TCI state |  | TCI.State.0 |
| Note: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases | | |

Table A.3.17.1.2-4: Aperiodic CSI-RS for tracking for SCS=30kHz

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | TRS.1.4 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 |
| aperiodicTriggeringOffsetL2 | slots | 2 |
| Aperiodic CSI-RS offset | slots | 2 for CSI-RS resource 1 and 2  3 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 | | |

### A.3.17.2 Configuration of CSI-RS for tracking for FR2

#### A.3.17.2.1 TDD

Table A.3.17.2.1-1: CSI-RS for tracking for SCS=120kHz Set 1

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | TRS.2.1 TDD |
| Bandwidth |  | BW of Active BWPNote 1,3 |
| SCS | kHz | 120 |
| 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 = 1 for CSI-RS resource 1 and 3  l0 = 5 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 | 80 for CSI-RS resource 1,2,3,4 |
| CSI-RS offset | slots | 40 for CSI-RS resource 1 and 2  41 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  Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active BWP size. | | |

Table A.3.17.2.1-2: CSI-RS for tracking for SCS=120kHz Set 2

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | TRS.2.2 TDD |
| Bandwidth |  | BW of Active BWPNote 1,3 |
| SCS | kHz | 120 |
| 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 = 2 for CSI-RS resource 1 and 3  l0 = 6 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 | 80 for CSI-RS resource 1,2,3,4 |
| CSI-RS offset | slots | 40 for CSI-RS resource 1 and 2  41 for CSI-RS resource 3 and 4 |
| EPRE ratio to SSS | dB | 0Note 2 |
| TCI state |  | TCI.State.1 |
| 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  Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active BWP size. | | |

Table A.3.17.2.1-3: Aperiodic CSI-RS for tracking for SCS=120kHz Set 1

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Reference channel |  | TRS.2.3 TDD |
| Bandwidth |  | BW of Active BWPNote 1,3 |
| SCS | kHz | 120 |
| 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 = 1 for CSI-RS resource 1 and 3  l0 = 5 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 |
| aperiodicTriggeringOffsetL2 | slots | 2 |
| Aperiodic CSI-RS offset | slots | 2 for CSI-RS resource 1 and 2  3 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  Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active BWP size. | | |

<End of Change 1>

<Start of Change 2>

#### A.4.5.2.X1 E-UTRAN – NR FR1 interruptions due to RRM and RLM/BFD measurements on deactivated NR PSCell

##### A.4.5.2.X1.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell interruptions due to RRM measurements and RLM/BFD measurements on the deactivated NR PSCell, and the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell in EN-DC according to the requirements specified in TS 36.133 clause 7.32.2.20 for RRM measurements and 7.32.2.X for RLM and BFD measurements. Supported test configurations are shown in table A.4.5.2.X1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.X1.1-1 and A.4.5.2.X1.1-2 below. And the E-UTRAN cell specific test parameters can be referred to in Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is E-UTRAN PCell, and Cell2 is deactivated NR FR1 PSCell. The test consists of one single period, T1.

Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. At the start of T1, the RRC message including *measCycleSCell* or *allowInterruptions* is received at the UE antenna connector and Cell2 is deactivated. During T1, Cell1 continuously schedules data in DL and the UE is configured with RRM and RLM/BFD measurements on the deactivated Cell2. It is assumed that Cell1 and Cell2 are synchronized with a timing difference not larger than 3ms between the two cells.

Table A.4.5.2.X1.1-1: Interruptions due to RRM and RLM/BFD measurements on deactivated NR PSCell supported test configurations

|  |  |
| --- | --- |
| 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 |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 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 |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.4.5.2.X1.1-2: General test parameters for E-UTRAN – NR interruptions due to measurements on deactivated PSCell in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | One is NR RF channel and the other is E-UTRAN RF channel |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured deactivated PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| CP length |  | Normal | Applicable to Cell1, Cell2 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

Table A.4.5.2.X1.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions due to measurements on deactivated PSCell in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell2 |
| Frequency Range | |  | FR1 |
| Duplex mode | Config 1,4 |  | FDD |
|  | Config 2,3,5,6 |  | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable |
|  | Config 2,5 |  | TDDConf.1.1 |
|  | Config 3,6 |  | TDDConf.2.1 |
| BWchannel | Config 1,4 |  | 10: NRB,c = 52 |
|  | Config 2,5 |  | 10: NRB,c = 52 |
|  | Config 3,6 |  | 40: NRB,c = 106 |
| Initial DL BWP | Config 1,4 |  | DLBWP.0.1 |
| Configuration | Config 2,5 |  | DLBWP.0.1 |
|  | Config 3,6 |  | DLBWP.0.1 |
| Dedicated DL BWP | Config 1,4 |  | DLBWP.1.1 |
| Configuration | Config 2,5 |  | DLBWP.1.1 |
|  | Config 3,6 |  | DLBWP.1.1 |
| Initial UL BWP | Config 1,4 |  | ULBWP.0.1 |
| Configuration | Config 2,5 |  | ULBWP.0.1 |
|  | Config 3,6 |  | ULBWP.0.1 |
| Dedicated UL BWP | Config 1,4 |  | ULBWP.1.1 |
| Configuration | Config 2,5 |  | ULBWP.1.1 |
|  | Config 3,6 |  | ULBWP.1.1 |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | Config 2,5 |  | SR.1.1 TDD |
|  | Config 3,6 |  | SR.2.1 TDD |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD |
| parameters | Config 2,5 |  | CR.1.1 TDD |
|  | Config 3,6 |  | CR.2.1 TDD |
| PDCCH CORESET | Config 1,4 |  | CCR.1.1 FDD |
| parameters | Config 2,5 |  | CCR.1.1 TDD |
|  | Config 3,6 |  | CCR.2.1 TDD |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD |
|  | Config 2,5 |  | TRS.1.1 TDD |
|  | Config 3,6 |  | TRS.1.2 TDD |
| OCNG Patterns | |  | OP.1 |
| SMTC Configuration | |  | SMTC.1 |
| TCI state | |  | TCI.State.0 |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | Config 3,6 |  | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low |
| EPRE ratio of PSS to SSS | |  |  |
| 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 | | dB | 0 |
| 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) | |  |  |
| NocNote 2 | | dBm/15 kHz | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 |
| Ês/Iot | | dB | 17 |
| Ês/Noc | | dB | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | -58.96 |
|  | Config 3,6 | dBm/38.16MHz | -52.86 |
| Time offset to Cell1 Note 4 | | μs | 500 |
| 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.  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 modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells | | | |

##### A.4.5.2.X1.2 Test Requirements

The UE shall be continuously scheduled in Cell1 during the entire length of T1 and the UE is configured with RRM and RLM/BFD measurements on the deactivated Cell2. During the time duration T1 the UE shall transmit at least 98.5% of ACK/NACK on E-UTRAN PCell.

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

<End of Change 2>

<Start of Change 3>

#### A.4.5.3.X2 Fast SCell Activation of known SCell in FR1 for 160ms SCell measurement cycle

##### A.4.5.3.X2.1 Test Purpose and Environment

The purpose of this test is to verify that the fast SCell activation times are within the requirements stated in clause 8.3.16, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.4.5.3.X2.1-1 below. The test parameters are given in Tables A.4.5.3.X2.1-2 and cell-specific parameters in A.4.5.3.X1.1-3 below. The test consists of two successive time periods, with duration of T1 and T2, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. The UE now starts monitoring the SCell. The test equipment sends a MAC message for activation of the SCell and triggering the aperiodic CSI-RS for fast SCell activation.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot , as defined in clause 8.3. The UE shall start reporting CSI in PSCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot to slot , as defined in clause 8.3, where is the interruption length given in clause 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe to subframe , where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and is the interruption length given in TS 36.133 [14] clause 7.32.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

Table A.4.5.3.X2.1-1: fast known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

|  |  |
| --- | --- |
| Configuration | 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 |
| 3 | LTE FDD, NR 30 kHz SSB SCS, ≥40 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 |
| 6 | LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration, | |

Table A.4.5.3.X2.1-2: General test parameters for fast known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.1 |
| Active PSCell |  | Cell 2 | Primary secondary cell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on E-UTRA RF channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on secondary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell3 timing offset to cell2 | μs | 0 |  |
| Time alignment error between cell3 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |
| k | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

Table A. 4.5.3.X2.1-3: Cell specific test parameters for fast known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | Cell 3 | | | |
|  | |  | T1 | T2 | T1 | | | T2 |
| SSB ARFCN | |  | freq1 | | freq2 | | | |
| Duplex mode | Config 1,4 |  | FDD | | | | | |
|  | Config 2,3,5,6 |  | TDD | | | | | |
| TDD configuration | Config 1,4 |  | Not Applicable | | | | | |
|  | Config 2,5 |  | TDDConf.1.1 | | | | | |
|  | Config 3,6 |  | TDDConf.2.1 | | | | | |
| BWchannel | Config 1,4 | MHz | Note 7 | | | | | |
|  | Config 2,5 |  | Note 7 | | | | | |
|  | Config 3,6 |  | Note 7 | | | | | |
| BWoccupied | Config 1,4 | RB | 52 Note 5 | | | | | |
| Config 2,5 | 52 Note 5 | | | | | |
| Config 3,6 | 106 Note 6 | | | | | |
| DL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 | | | | | |
| DL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 | | | | | |
| UL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 | | | | | |
| UL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 | | | | | |
| Aperiodic CSI-RS for Scell activation | Config 1,4 |  | N/A | | | | TRS.1.3 FDD | |
| Config 2,5 | N/A | | | | TRS.1.3 TDD | |
| Config 3,6 | N/A | | | | TRS.1.4 TDD | |
| gapBetweenBursts |  | Slot | N/A | | | | | |
| DRX Cycle | | ms | Not Applicable | | | | | |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD | | SR.1.1 FDD | | | |
| measurement channel | Config 2,5 |  | SR.1.1 TDD | | SR.1.1 TDD | | | |
|  | Config 3,6 |  | SR.2.1 TDD | | SR.2.1 TDD | | | |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD | | CR.1.1 FDD | | | |
| Reference Channel | Config 2,5 |  | CR.1.1 TDD | | CR.1.1 TDD | | | |
|  | Config 3,6 |  | CR.2.1 TDD | | CR.2.1 TDD | | | |
| RMC CORESET | Config 1,4 |  | CCR.1.1 FDD | | CCR.1.1 FDD | | | |
| Reference Channel | Config 2,5 |  | CCR.1.1 TDD | | CCR.1.1 TDD | | | |
|  | Config 3,6 |  | CCR.2.1 TDD | | CCR.2.1 TDD | | | |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD | | TRS.1.1 FDD | | | |
|  | Config 2,5 |  | TRS.1.1 TDD | | TRS.1.1 TDD | | | |
|  | Config 3,6 |  | TRS.1.2 TDD | | TRS.1.2 TDD | | | |
| OCNG Patterns | Config 1,2,4,5 |  | OP.1 Note 5 | | | | | |
| Config 3,6 |  | OP.1 Note 6 | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | | | | |
|  | Config 3,6 |  | SSB.2 FR1 | | | | | |
| CSI-RS configuration for CSI reporting | Config 1,4 |  | CSI-RS.1.1 FDD | | | | | |
| Config 2,5 |  | CSI-RS.1.1 TDD | | | | | |
| Config 3,6 |  | CSI-RS.2.1 TDD | | | | | |
| PDSCH/PDCCH | Config 1,2,4,5 | kHz | 15 | | | | | |
| subcarrier spacing | Config 3,6 |  | 30 | | | | | |
| reportConfigType | Config 1-6 |  | periodic | | | | | |
| reportQuantity | Config 1-6 |  | cri-RI-PMI-CQI | | | | | |
| CSI reporting periodicity | Config 1,2,4,5 | slot | 5 | | | N/A | | |
| CSI reporting offset | Config 3,6 | slot | 10 | | | N/A | | |
| Config 1,2,4,5 | 2 | | | N/A | | |
| Config 3,6 | 4 | | | N/A | | |
| EPRE ratio of PSS to SSS | |  |  | | | | | |
| 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 | | dB | 0 | | | | | |
| 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) | |  |  | | | | | |
| Note2 | | dBm/15kHz | -104 | | | | | |
| Note2 | Config 1,2,4,5 | dBm/SCS | -104 | | | | | |
|  | Config 3,6 |  | -101 | | | | | |
|  | | dB | 17 | | | | | |
|  | | dB | 17 | | | | | |
| SS-RSRPNote3 | Config 1,2,4,5 | dBm/SCS | -87 | | | | | |
|  | Config 3,6 |  | -84 | | | | | |
| CSI-RSRPNote3 | Config 1,2,4,5 | dBm/SCS | -87 | | | | | | |
| Config 3,6 | -84 | | | | | | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | | | | | |
| Propagation condition | | - | AWGN | | | | | |
| IoNote3 | Config 1,2,4,5 | dBm/  9.36MHz | -58.96 | | | | | |
| Config 3,6 | dBm/  38.16MHz | -52.87 | | | | | |
| 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 within BWoccupied.  Note 3: SS-RSRP, Io and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]  Note 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | | | | | |

##### A.4.5.3.X1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available uplink resource if an available uplink resource is subject to interruption. Whether CSI report in slot (m+k) was interrupted is checked by monitoring ACK/NACK sent in PCell in slot (m+k).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot , Tactivation\_time = TFirstATRS + 5ms, as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot to , and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe to subframe, as defined in clause 8.3.

The interruption of PSCell shall not be more than the values specified for EN-DC in Clause 8.2.1.2.19.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

<End of Change 3>

<Start of Change 4>

#### A.4.5.3.x3 Fast SCell Activation of known SCell in FR1 for 640 ms SCell measurement cycle

##### A.4.5.3.x3.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.x2.1. The supported test configurations are the same as defined in clause A.4.5.3.x2.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.x3.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.x2.1-2. The listed parameter values in Tables A.4.5.3.x3.1-2 will replace the values of corresponding parameters in Tables A.4.5.3.x2.1-3.

Table A.4.5.3.x3.1-1: General test parameters for known FR1 SCell activation case, 640 ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |

Table A. 4.5.3.x3.1-2: Cell specific test parameters for known FR1 Scell activation case, 640ms Scell measurement cycle

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | Cell 3 | |
|  | |  | T1 | T2 | T1 | T2 |
| gapBetweenBursts |  | Slot | 2 | | | |

##### A.4.5.3.x2.2 Test Requirements

The test requirements defined in clause A.4.5.3.x2.2 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstATRS + Tgap + TATRS+ 5ms.<End of Change 4>

<Start of Change 5>

### A.4.5.X4 PSCell activation and deactivation delay

#### A.4.5.X4.1 PSCell activation and deactivation delay

##### A.4.5.X4.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell activation and deactivation delay under EN-DC are within the requirements stated in clause 7.38 in TS 36.133 [15] for the case when UE configured with one deactivated SCG and when PScell in one SCG is being activated where the PSCell is known by the UE at the time of activation.

Supported test configurations are shown in A.4.5.X4.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.2-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.4.5.X4.1.1-2, cell-specific parameters in A.4.5.X4.1.1-3 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4. There are two carriers each with one cell. The UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) and PSCell (Cell2) is in deactivated state. During T1, both Cell1 and Cell2 are known to UE and UE performs measurement on deactivated PCell. Before the test starts the UE is configured RLM and BFD on deactivated PSCell. During T1, UE performs RLM and BFD on the deactivated PSCell and TCI state is known.

The test system shall send a RRC message to the UE to activate PSCell (Cell 2) on radio channel 2, where no any PSCell parameter is modified in the RRC message. The RRC message (to activate PSCell) also includes a request for the UE to transmit scheduling request on PUCCH for the PSCell after the PSCell has been successfully activated. The RRC message to activate PSCell shall be sent to the UE during period T1. The point in time at which the RRC message to activate PSCell (Cell2) is received at the UE antenna connector defines the start of period T2.

The test system shall observe the periodic reporting of CSI for PSCell during T3. The point in time at which the UE has sent scheduling request on PUCCH for PSCell (Cell 2) defines the start of period T3.

The test system shall send a RRC message to the UE to deactivate PSCell (Cell 2) on radio channel 2. The RRC message to deactivate PSCell (Cell2) shall be sent to the UE during period T3, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to deativate PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

Table A.4.5.X4.1.1-1: Supported test configurations for FR1 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD |
| 2 | LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD |
| 3 | LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD |
| 4 | LTE TDD, NR SCS 15 kHz, BW 10 MHz, FDD |
| 5 | LTE TDD, NR SCS 15 kHz, BW 10 MHz, TDD |
| 6 | LTE TDD, NR SCS 30 kHz, BW 40 MHz, TDD |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.4.5.X4.1.1-2: General Test Parameters for PSCell activation and deactivation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Deactivated cell |  | Cell2 | To be activated PSCell on RF channel number 2. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Deactivated cell |  | Cell2 | PSCell deactivated on RF channel number 2. |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| Scheduling request resource priodicity | |  | 20ms | At the starting of period T3, UE sends a SR on PUCCH for PSCell |
| T1 | | s | 1 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | 1 | During this time the UE adds the PSCell. |
| T3 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T4 | | s | 1 | During this time the UE releases the PSCell. |

Table A.4.5.X4.1.1-3: Cell Specific Parameters for PSCell activation and deactivation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | | | |
| T1 | | T2 | T3 | T4 |
| E-UTRA RF Channel Number |  | 1,2,3,4,5,6 | 1 | | | | |
| NR RF Channel Number |  | 1,2,3,4,5,6 | 2 | | | | |
| TDD |  | 1,4 | Not Applicable | | | | |
| configuration |  | 2,5 | TDDConf.1.1 | | | | |
|  |  | 3,6 | TDDConf.2.1 | | | | |
| BWchannel | MHz | 1,4 | 10: NRB,c = 52 | | | | |
|  |  | 2,5 | 10: NRB,c = 52 | | | | |
|  |  | 3,6 | 40: NRB,c = 106 | | | | |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 | | | | |
| PDSCH Reference |  | 1,4 | SR.1.1 FDD | | | | |
| measurement |  | 2,5 | SR.1.1 TDD | | | | |
| channel |  | 3,6 | SR.2.1 TDD | | | | |
| RMSI CORESET Reference |  | 1,4 | CR.1.1 FDD | | | | |
| Channel |  | 2,5 | CR.1.1 TDD | | | | |
|  |  | 3,6 | CR.2.1 TDD | | | | |
| Dedicated CORESET Reference |  | 1,4 | CCR.1.1 FDD | | | | |
| Channel |  | 2,5 | CCR.1.1 TDD | | | | |
|  |  | 3,6 | CCR.2.1 TDD | | | | |
| OCNG Patterns |  | 1,2,3,4,5,6 | OP.1 | | | | |
| SSB configuration |  | 1,2,4,5 | SSB.1 FR1 | | | | |
|  |  | 3,6 | SSB.2 FR1 | | | | |
| SMTC configuration |  | 1,2,4,5 | SMTC.1 | | | | |
|  |  | 3,6 | SMTC.1 | | | | |
| TRS Configuration |  | 1,4 | TRS.1.1 FDD | | | | |
|  |  | 2,5 | TRS.1.1 TDD | | | | |
|  |  | 3,6 | TRS.1.2 TDD | | | | |
| CSI-RS configuration for CSI reporting |  | 1,4 | CSI-RS.1.1 FDD | | | | |
| 2,5 | CSI-RS.1.1 TDD | | | | |
| 3,6 | CSI-RS.2.1 TDD | | | | |
| reportConfigType |  | 1,2,3,4,5,6 | periodic | | | | |
| reportQuantity |  | 1,2,3,4,5,6 | cri-RI-PMI-CQI | | | | |
| CSI reporting periodicity | slot | 1,2,4,5 | 5 | | | | |
| 3,6 | 10 | | | | |
| CSI reporting offset | slot | 1,2,4,5 | 2 | | | | |
| 3,6 | 4 | | | | |
| EPRE ratio of PSS to SSS |  |  |  | | | | |
| 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 | dB | 1,2,3,4,5,6 | 0 | | | | |
| 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) |  |  |  | | | | |
| Note2 | dBm/15 kHz | 1,2,3,4,5,6 | N/A | -85 | | | |
| Note2 | dBm/SCS | 1,2,4,5 | N/A | -85 | | | |
|  |  | 3,6 | N/A | -82 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
| SS-RSRPNote3 | dBm/SCS | 1,2,4,5 | -infinity | -85 | | | |
|  |  | 3,6 | -infinity | -82 | | | |
| IoNote3 | dBm/9.36MHz | 1,2,4,5 | N/A | -57 | | | |
|  | dBm/38.1MHz | 3,6 | N/A | -51 | | | |
| Propagation condition |  | 1,2,3,4,5,6 | 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.  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.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

##### A.4.5.X4.1.2 Test Requirements

The UE performs RACH-less based PSCell activation. UE shall transmit the SR on PUCCH for PSCell at latest 65 msNote1 into T2.

The UE shall send at least one PUSCH on PSCell during T3.

The UE shall stop transmit PUSCH for PSCell in at latest 20 ms into T4.

All the above test requirements shall be fulfilled for the observed PSCell activation delay and PSCell deactivation delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.38 in TS 36.133 [15]:

Tactivation\_time = TRRC\_delay + Tprocessing + Tsearch + T∆ + TIU + 2 ms

Where:

TRRC\_delay = 20ms

Tprocessing = 5 ms

Tsearch = 0 ms

T∆ = 20ms

TIU= max 20 ms

<End of Change 5>

<Start of Change 6>

### A.4.5.X5 Conditional PSCell addition and release delay (FR1 EN-DC)

#### A.4.5.X5.1 Addition and Release Delay of PSCell

##### A.4.5.X5.1.1 Test purpose and environment

The purpose of this test is to verify that the NR conditional PSCell addition and release delays under EN-DC are within the requirements stated in clause 8.9A.2.

##### A.4.5.X5.1.2 Test Parameters

Supported test configurations are shown in A.4.5.X5.1.2-1. The test parameters for the E-UTRA cell are given in Table A.4.5.X5.1.2-2. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.4.5.X5.1.2-2 and cell-specific parameters in A.4.5.X5.1.2-3 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

At the start of time duration T1, the UE does not have any timing information of Cell 2. NR shall configure a condition implying addition to cell 2 during T1, at a time earlier than TRRC\_delay before the beginning of T2.

At the start of T2, cell 2 becomes detectable and meets the addition condition. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send an RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.4.5.X5.1.2-1: Supported test configurations for FR1 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD |
| 2 | LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD |
| 3 | LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD |
| 4 | LTE TDD, NR SCS 15 kHz, BW 10 MHz, FDD |
| 5 | LTE TDD, NR SCS 15 kHz, BW 10 MHz, TDD |
| 6 | LTE TDD, NR SCS 30 kHz, BW 40 MHz, TDD |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.4.5.X5.1.2-2: General Test Parameters for Conditional PSCell Addition and Release

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
|  | Neighbour cell |  | Cell2 | Neighbour cell on RF channel number 2. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour Cell |  | Cell2 | PSCell released on RF channel number 2. |
| B1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event B1. |
|  | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event B1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
|  | Time to Trigger | S | 0 |  |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration on cell2 | |  | FR1 PRACH configuration 1 | Captured in A.3.8.2.1 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 5 | During this time the PCell is known and Cell 2 is unknown. |
| T2 | | s | ≤7 | During this time Cell 2 meets the addition condition and UE adds this PSCell. |
| T3 | | s | 1 | During this time the UE sends CSI reports for Cell 2. And the test system shall send an RRC message instructing the UE to release the PSCell. |
| T4 | | s | 1 | During this time the UE releases the Cell 2. |

Table A.4.5.X5.1.2-3: Cell Specific Parameters for Conditional PSCell Addition and Release

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | | | |
|  |  |  | T1 | | T2 | T3 | T4 |
| E-UTRA RF Channel Number |  | 1,2,3,4,5,6 | 1 | | | | |
| NR RF Channel Number |  | 1,2,3,4,5,6 | 2 | | | | |
| TDD |  | 1,4 | Not Applicable | | | | |
| configuration |  | 2,5 | TDDConf.1.1 | | | | |
|  |  | 3,6 | TDDConf.2.1 | | | | |
| BWchannel | MHz | 1,4 | 10: NRB,c = 52 | | | | |
|  |  | 2,5 | 10: NRB,c = 52 | | | | |
|  |  | 3,6 | 40: NRB,c = 106 | | | | |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 | | | | |
| PDSCH Reference |  | 1,4 | SR.1.1 FDD | | | | |
| measurement |  | 2,5 | SR.1.1 TDD | | | | |
| channel |  | 3,6 | SR.2.1 TDD | | | | |
| RMSI CORESET Reference |  | 1,4 | CR.1.1 FDD | | | | |
| Channel |  | 2,5 | CR.1.1 TDD | | | | |
|  |  | 3,6 | CR.2.1 TDD | | | | |
| Dedicated CORESET Reference |  | 1,4 | CCR.1.1 FDD | | | | |
| Channel |  | 2,5 | CCR.1.1 TDD | | | | |
|  |  | 3,6 | CCR.2.1 TDD | | | | |
| OCNG Patterns |  | 1,2,3,4,5,6 | OP.1 | | | | |
| SSB configuration |  | 1,2,4,5 | SSB.1 FR1 | | | | |
|  |  | 3,6 | SSB.2 FR1 | | | | |
| SMTC configuration |  | 1,2,4,5 | SMTC.1 | | | | |
|  |  | 3,6 | SMTC.1 | | | | |
| TRS Configuration |  | 1,4 | TRS.1.1 FDD | | | | |
|  |  | 2,5 | TRS.1.1 TDD | | | | |
|  |  | 3,6 | TRS.1.2 TDD | | | | |
| CSI-RS configuration for CSI reporting |  | 1,4 | CSI-RS.1.1 FDD | | | | |
| 2,5 | CSI-RS.1.1 TDD | | | | |
| 3,6 | CSI-RS.2.1 TDD | | | | |
| reportConfigType |  | 1,2,3,4,5,6 | periodic | | | | |
| reportQuantity |  | 1,2,3,4,5,6 | cri-RI-PMI-CQI | | | | |
| CSI reporting periodicity | slot | 1,2,4,5 | 5 | | | | |
| 3,6 | 10 | | | | |
| CSI reporting offset | slot | 1,2,4,5 | 2 | | | | |
| 3,6 | 4 | | | | |
| EPRE ratio of PSS to SSS |  |  |  | | | | |
| 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 | dB | 1,2,3,4,5,6 | 0 | | | | |
| 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) |  |  |  | | | | |
| Note2 | dBm/15 kHz | 1,2,3,4,5,6 | N/A | -85 | | | |
| Note2 | dBm/SCS | 1,2,4,5 | N/A | -85 | | | |
|  |  | 3,6 | N/A | -82 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
| SS-RSRPNote3 | dBm/SCS | 1,2,4,5 | -infinity | -85 | | | |
|  |  | 3,6 | -infinity | -82 | | | |
| IoNote3 | dBm/9.36MHz | 1,2,4,5 | N/A | -57 | | | |
|  | dBm/38.1MHz | 3,6 | N/A | -51 | | | |
| Propagation condition |  | 1,2,3,4,5,6 | 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.  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.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

##### A.4.5.X5.1.3 Test Requirements

TRRC\_delay + TEvent\_DU occurs during T1 as the addition condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than Tmeasure + TUE\_preparation + Tprocessing + T∆ + TPSCell\_ DU + 2 ms = 1040+10+62ms=1112 ms from the start of T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T4.

All of the above test requirements shall be fulfilled in order for the observed conditional PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

<End of Change 6>

<Start of Change 7>

#### A.5.5.3.X1 Fast SCell Activation of SCell in FR2 intra-band

##### A.5.5.3.X1.1 Test Purpose and Environment

The purpose of this test is to verify that the fast SCell activation and deactivation times are within the requirements stated in clause 8.3.16, when the SCell in FR2 is known by the UE at the time of activation.

The supported test configurations are shown in table A.5.5.3.X1-1 below. The test parameters are given in Tables A.5.5.3.X1-2 and cell-specific parameters in A.5.5.3.X1-3 below. The test consists of two successive time periods, with duration of T1 and T2, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test. In this case, OTA related test parameters are shown in table A.5.5.3.X1.1-4 below.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. The UE now starts monitoring the SCell. The test equipment sends a MAC message for activation of the SCell and triggering the aperiodic CSI-RS for fast SCell activation.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m (where m mode 20=1), defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot , as defined in clause 8.3.16. The UE shall start reporting CSI in PSCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot to slot , as defined in clause 8.3, where is the interruption length given in clause 8.2.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

**Table A.5.5.3.X1.1-1: Supported test configurations for FR2 SCell activation case with FR2 PSCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

**Table A.5.5.3.X1.1-2: General test parameters for FR2 SCell activation case with FR2 PSCell**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.2 |
| Active PSCell |  | Cell 2 | Primary secondary cell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on E-UTRA RF channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell3 timing offset to cell2 | μs | 0 |  |
| Time alignment error between cell3 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |
| k | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

**Table A.5.5.3.X1.1-3: Cell specific test parameters for FR2 SCell activation case with FR2 PSCell**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ParameterNote 5** | **Unit** | **Cell 2** | | **Cell 3** | |
|  |  | **T1** | **T2** | **T1** | **T2** |
| SSB ARFCN |  | freq1 | | freq2 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 66 | | 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | | CR.3.1 TDD | |
| RMC CORESET Reference Channel |  | CCR.3.1 TDD | | CCR.3.1 TDD | |
| DL initial BWP configuration |  | DLBWP.0.1 | | | |
| DL dedicated BWP configuration |  | DLBWP.1.1 | | | |
| UL initial BWP configuration |  | ULBWP.0.1 | | | |
| UL dedicated BWP configuration |  | ULBWP.1.1 | | | |
| OCNG Patterns |  | OP.1 | | | |
| SMTC configuration |  | SMTC.1 | | | |
| SSB configuration |  | SSB.1 FR2 | | | |
| Aperiodic CSI-RS for Scell activation |  | - | | TRS.2.3 | |
| gapBetweenBursts | slots | N/A | | | |
| TCI state |  | TCI.State.0 | | | |
| TRS configuration |  | TRS.2.1 TDD | | | |
| CSI-RS configuration for CSI reporting |  | CSI-RS.3.1 TDD | | | |
| reportConfigType |  | periodic | | N/A | |
| reportQuantity |  | cri-RI-PMI-CQI | | N/A | |
| CSI reporting periodicity | slot | 40 | | N/A | |
| CSI reporting offset | slot | 4 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | | | |
| 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\_DMRS |  |  | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  | | | |
| Propagation conditions |  | 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.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: All parameters apply for configuration 1 and 2. | | | | | |

Table A.5.5.3.X1.1-4: OTA related test parameters for FR2 SCell activation case with FR2 PSCell

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 2 | | Cell 3 | |
|  |  | T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  | Setup 1 according to A.3.15.1 | | | |
| Assumption for UE beamsNote 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -104.7 | | -104.7 | |
| Note1 | dBm/SCSNote3 | -95.7 | | -95.7 | |
|  | dB | 7 | | 7 | |
| SS\_RPNote2 | dBm/SCS Note4 | -88.7 | | N/A | |
| CSI-RS\_RPNote2 | dBm/SCS Note4 | N/A | | -88.7 | |
|  | dB | 7 | | 7 | |
| IoNote2 | dBm/95.04 MHz Note4 | -58.92 | | -58.92 | |
| 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: Es/Iot, SS\_RP, CSI\_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: Void  Note 6: All parameters apply for configuration 1 and 2  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.5.5.3.X1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available uplink resource if an available uplink resource is subject to interruption. Whether CSI report in slot (m+k) was interrupted is checked by monitoring ACK/NACK sent in PCell in slot (m+k).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot , Tactivation\_time = TFirstATRS+ 5ms, as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot to .

The interruption of PSCell shall not be more than the values specified for EN-DC in Clause 8.2.1.2.4.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

<End of Change 7>

<Start of Change 8>

### A.5.5.X2 PSCell activation and deactivation delay

#### A.5.5.X2.1 PSCell activation and deactivation delay

##### A.5.5.X2.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell activation and deactivation delay under EN-DC are within the requirements stated in clause 7.38 in TS 36.133 [15] for the case when UE configured with one deactivated SCG and when PScell in one SCG is being activated where the PSCell is known by the UE at the time of activation.

Supported test configurations are shown in A.5.5.X2.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.2-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.5.5.X2.1.1-2, cell-specific parameters in A.5.5.X2.1.1-3 and OTA parameters in A.5.5.X2.1.1-4 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4. There are two carriers each with one cell. The UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) and PSCell (Cell2) is in deactivated state. During T1, both Cell1 and Cell2 are known to UE and UE performs measurement on deactivated PCell. Before the test starts the UE is configured RLM and BFD on deactivated PSCell. During T1, UE performs RLM and BFD on the deactivated PSCell and TCI state is known.

The test system shall send a RRC message to the UE to activate PSCell (Cell 2) on radio channel 2, where no any PSCell parameter is modified in the RRC message. The RRC message (to activate PSCell) also includes a request for the UE to transmit scheduling request on PUCCH for the PSCell after the PSCell has been successfully activated. The RRC message to activate PSCell shall be sent to the UE during period T1. The point in time at which the RRC message to activate PSCell (Cell2) is received at the UE antenna connector defines the start of period T2.

The test system shall observe the periodic reporting of CSI for PSCell during T3. The point in time at which the UE has sent scheduling request on PUCCH for PSCell (Cell 2) defines the start of period T3.

The test system shall send a RRC message to the UE to deactivate PSCell (Cell 2) on radio channel 2. The RRC message to deactivate PSCell (Cell2) shall be sent to the UE during period T3, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to deativate PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

Table A.5.5.X2.1.1-1: 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 |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.X2.1.1-2: General Test Parameters for PSCell activation and deactivation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Deactivated cell |  | Cell2 | SCell on RF channel number 2. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Deactivated cell |  | Cell2 | PSCell deactivated on RF channel number 2. |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| Scheduling request resource priodicity | |  | 20ms | At the starting of period T3, UE sends a SR on PUCCH for PSCell |
| T1 | | s | 1 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | 1 | During this time the UE adds the PSCell. |
| T3 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T4 | | s | 1 | During this time the UE releases the PSCell. |

Table A.5.5.X2.1.1-3: Cell Specific Parameters for PSCell activation and deactivation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | | |
|  |  |  | T1 | T2 | T3 | T4 |
| E-UTRA Channel Number |  | 1,2 | 1 | | | |
| NR Channel Number |  | 1,2 | 2 | | | |
| 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 | 48 | | | |
| 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 | TRS.2.1 TDD | | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | |
| PDSCH Reference measurement channel |  | 1,2 | SR.3.3 TDD | | | |
| RMSI CORESET Reference Channel |  | 1,2 | CR.3.2 TDD | | | |
| Dedicated CORESET Reference Channel |  | 1,2 | CCR.3.7 TDD | | | |
| OCNG Patterns |  | 1,2 | OP.3 | | | |
| SSB configuration |  | 1,2 | SSB.2 FR2 | | | |
| SMTC configuration |  | 1,2 | SMTC.2 | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 120 | | | |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD | | | |
| CSI-RS configuration for CSI reporting |  | 1,2 | CSI-RS.3.1 TDD | | | |
| reportConfigType |  | 1,2 | periodic | | | |
| reportQuantity |  | 1,2 | cri-RI-PMI-CQI | | | |
| CSI reporting periodicity | slot | 1,2 | 40 | | | |
| CSI reporting offset | slot | 1,2 | 4 | | | |
| EPRE ratio of PSS to SSS | dB | 1,2 | 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 | | | |

Table A.5.5.X2.1.1-4: OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | | |
| T1 | T2 | T3 | T4 |
| Angle of arrival configuration |  | Setup 2a according to clause A.3.15.2.1 | | | |
| Assumption for UE beamsNote 6 |  | Rough | | | |
| Ês Note2 | dBm/SCS | -81 | | | |
| SSB\_RPNote2, Note 4 | dBm/SCS | -81 | | | |
| BB Note 2, Note 7 | dB | 4.88 | | | |
| IoNote 2, Note 4 | dBm/95.04 MHz | -56.41 | | | |
| Note 1: Void  Note 2: Es/Iot, 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: Void  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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | |

##### A.5.5.X2.1.2 Test Requirements

The UE performs RACH-less based PSCell activation. UE shall transmit the SR on PUCCH for PSCell at latest 65 msNote1 into T2.

The UE shall send at least one PUSCH on PSCell during T3.

The UE shall stop transmit PUSCH for PSCell in at latest 20 ms into T4.

All the above test requirements shall be fulfilled for the observed PSCell activation delay and PSCell deactivation delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.38 in TS 36.133 [15]:

Tactivation\_time = TRRC\_delay + Tprocessing + Tsearch + T∆ + TIU + 2 ms

Where:

TRRC\_delay = 20ms

Tprocessing = 5ms

Tsearch = 0 ms

T∆ = 20ms

TIU= max 20 ms

<End of Change 8>

<Start of Change 9>

A.5.5.X3 Conditional PSCell addition and release delay

A.5.5.X3.1 Addition and Release Delay of NR PSCell

A.5.5.X3.1.1 Test purpose and environment

The purpose of this test is to verify that the conditional NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 8.9A.2.

Supported test configurations are shown in A.5.5.X3.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.2-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.5.5.X2.1.1-2, cell-specific parameters in A.5.5.X3.1.1-3 and OTA parameters in A.5.5.X3.1.1-4 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC.

During T1 only Cell 1 is known to the UE. NR shall configure a condition implying PSCell addition (Cell 2) during T1, at a time earlier than TRRC\_delay before the beginning of T2.

Starting T2, Cell 2 becomes detectable. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T3. The test system shall observe the periodic reporting of CSI for PSCell during T3.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T3, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

**Table A.5.5.X3.1.1-1: 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 |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.5.5.X3.1.1-2: General Test Parameters for** **Conditional PSCell Addition and Release**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour cell |  | Cell2 | Neighbour cell on RF channel number 2. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour Cell |  | Cell2 | PSCell released on RF channel number 2. |
| B1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event B1. |
|  | Threshold RSRP | dBm | -118 | Actual RSRP threshold for event B1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
|  | Time to Trigger | s | 0 |  |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| Gap pattern ID | |  | gp0 |  |
| PRACH configuration on cell2 | |  | FR2 configuration 2 | Captured in A.3.8.3.2 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 1 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | <7 | During this time the UE adds the PSCell. |
| T3 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T4 | | s | 1 | During this time the UE releases the PSCell. |

**Table A.5.5.X3.1.1-3: Cell Specific Parameters for Conditional PSCell Addition and Release**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test** | | | |
|  |  |  | **T1** | **T2** | **T3** | **T4** |
| E-UTRA Channel Number |  | 1,2 | 1 | | | |
| NR Channel Number |  | 1,2 | 2 | | | |
| 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 | 48 | | | |
| 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 | TRS.2.1 TDD | | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | |
| PDSCH Reference measurement channel |  | 1,2 | SR.3.3 TDD | | | |
| RMSI CORESET Reference Channel |  | 1,2 | CR.3.2 TDD | | | |
| Dedicated CORESET Reference Channel |  | 1,2 | CCR.3.7 TDD | | | |
| OCNG Patterns |  | 1,2 | OP.3 | | | |
| SSB configuration |  | 1,2 | SSB.2 FR2 | | | |
| SMTC configuration |  | 1,2 | SMTC.2 | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 120 | | | |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD | | | |
| CSI-RS configuration for CSI reporting |  | 1,2 | CSI-RS.3.1 TDD | | | |
| reportConfigType |  | 1,2 | periodic | | | |
| reportQuantity |  | 1,2 | cri-RI-PMI-CQI | | | |
| CSI reporting periodicity | slot | 1,2 | 40 | | | |
| CSI reporting offset | slot | 1,2 | 4 | | | |
| EPRE ratio of PSS to SSS | dB | 1,2 | 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 | | | |

**Table A.5.5.X2.1.1-4: OTA related test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 2** | | | |
| **T1** | **T2** | **T3** | **T4** |
| Angle of arrival configuration |  | Setup 2a according to clause A.3.15.2.1 | | | |
| Assumption for UE beamsNote 6 |  | Rough | | | |
| Ês Note2 | dBm/SCS | -∞ | -81 | | |
| SSB\_RPNote2, Note 4 | dBm/SCS | -∞ | -81 | | |
| BB Note 2, Note 7 | dB | -∞ | 4.88 | | |
| IoNote 2, Note 4 | dBm/95.04 MHz | N/A | -56.41 | | |
| Note 1: Void  Note 2: Es/Iot, 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: Void  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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | |

A.5.5.X3.1.2 Test Requirements

TRRC\_delay + TEvent\_DU occurs during T1 as the PSCell addition condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall transmit the PRACH to PSCell (Cell 2) less than Tconfig\_PSCell\_Addition\_Conditional Note1 into T2.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T3.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T3

The UE shall stop sending CSI reports for PSCell in at latest 20 ms into T4.

All the above test requirements shall be fulfilled for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay during T2 can be expressed as follows:

Tconfig\_PSCell\_Addition\_Conditional = Tmeasure + TUE\_preparation + Tprocessing + T∆ + TPSCell\_ DU + 2 ms

Where:

Tmeasure = 6720ms for power class 1 or 4160 for power class 2/3/4

TUE\_preparation = 10ms

Tprocessing = 40ms

T∆ = 20ms

TPSCell\_ DU = 1\*10+10 = 20 ms

<End of Change 9>

<Start of Change 10>

#### A.6.5.3.X1 Fast SCell Activation of known SCell in FR1 in non-DRX for 160ms SCell measurement cycle

##### A.6.5.3.X1.1 Test Purpose and Environment

The purpose of this test is to verify that the fast SCell activation and deactivation times are within the requirements stated in clause 8.3.16, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.X1.1-1 below. The test parameters are given in Tables A.6.5.3.X1.1-2 and cell-specific parameters in A.6.5.3.X1.1-3 below. The test consists of two successive time periods, with duration of T1and T2, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell and triggering the aperiodic CSI-RS for fast SCell activation.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n (where n mode 20=1), defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot , as defined in clause 8.3. The UE shall start reporting CSI in PCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot to , as defined in clause 8.3, where is the interruption length given in clause 8.2.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

Table A.6.5.3.X1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration, | |

Table A.6.5.3.X1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| THARQ | ms | Config 1: 2  Config 2: 3  Config 3: 2.5 | k1NR slot length  k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.6.5.3.X1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| Duplex mode | Config 1 |  | FDD | | | |
|  | Config 2,3 |  | TDD | | | |
| TDD configuration | Config 1 |  | Not applicable | | | |
|  | Config 2 |  | TDDConf.1.1 | | | |
|  | Config 3 |  | TDDConf.2.1 | | | |
| BWchannel | Config 1,2 | MHz | Note 7 | | | |
|  | Config 3 |  | Note 7 | | | |
| BWoccupied | Config 1,2 | RB | 52 Note 5 | | | |
| Config 3 | 106 Note 6 | | | |
| Initial BWP configuration | |  | DLBWP.0.2 | | | |
| TCI state | |  | TCI.State.0 | | | |
| TRS Configuration | Config 1 |  | TRS.1.1 FDD | | | |
| Config 2 | TRS.1.1 TDD | | | |
| Config 3 | TRS.1.2 TDD | | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | - | |
| Config 2 | SR.1.1 TDD | | - | |
| Config 3 | SR.2.1 TDD | | - | |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | | - | |
| Config 2 | CCR.1.1 TDD | | - | |
| Config 3 | CCR.2.1 TDD | | - | |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | | - | |
| Config 2 | CR.1.1 TDD | | - | |
| Config 3 | CR.2.1 TDD | | - | |
| OCNG Patterns | Config 1,2 |  | OP.1 Note 5 | | | |
| Config 3, | OP.1 Note 6 | | | |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | | | |
|  | Config 3 | SSB.2 FR1 | | | |
| Aperiodic CSI-RS for Scell activation | Config 1 |  | N/A | | TRS.1.3 FDD | |
| Config 2 |  | N/A | | TRS.1.3 TDD | |
| Config 3 |  | N/A | | TRS.1.4 TDD | |
| gapBetweenBursts |  | slots | N/A | | | |
| CSI-RS configuration for CSI reporting (Note 8) | Config 1 |  | CSI-RS.1.1 FDD | | | |
| Config 2 |  | CSI-RS.1.1 TDD | | | |
| Config 3 |  | CSI-RS.2.1 TDD | | | |
| SMTC configuration | |  | SMTC.1 | | | |
| reportConfigType | |  | periodic | | | |
| reportQuantity | |  | cri-RI-PMI-CQI | | | |
| CSI reporting periodicity for PCell | Config 1,2 | slot | 5 | | - | |
|  | Config 3 |  | 10 | | - | |
| CSI reporting offset for PCell | Config 1,2 | slot | 3 | | - | |
|  | Config 3 |  | 5 | | - | |
| CSI reporting periodicity for SCell | Config 1,2 | slot | 5 | | N/A | |
| Config 3 | 10 | | N/A | |
| CSI reporting offset for SCell | Config 1,2 | slot | 2 | | N/A | |
| Config 3 | 4 | | N/A | |
| 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) | |  |  | | | |
| Note2 | Config 1,2 | dBm/SCS | -104 | | | |
|  | Config 3 | -101 | | | |
|  | | dB | 17 | | | |
|  | | dB | 17 | | | |
| SS-RSRPNote3 | Config 1,2 | dBm/SCS | -87 | |  | |
|  | Config 3 | -84 | |  | |
| CSI-RSRPNote3 | Config 1,2 | dBm/SCS |  | | -87 | |
| Config 3 |  | | -84 | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | | | |
| Io Note3 | Config 1,2 | dBm/  9.36MHz | -58.96 | | | |
| Config 3 | dBm/  38.16MHz | -52.87 | | | |
| 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.  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 within BWoccupied.  Note 3: SS-RSRP, CSI-RSRP, Io and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel.  Note 8: On top of the reference configurations, CSI-RS offset should be set to meet the CSI reference resource timing definition in TS 38.214 cl. 5.2.2.5. | | | | | | |

##### A.6.5.3.X1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption.During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot , Tactivation\_time = TFirstATRS + 5ms, as defined in clause 8.3.16.

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot , Tactivation\_time = TFirstATRS + 5ms, as defined in clause 8.3.16.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3.16.

The interruption on any activated serving cell shall not be more than the values specified for SA in clause 8.2.2.2.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

<End of Change 10>

<Start of Change 11>

#### A.6.5.3.X2 SCell Activation of known SCell in FR1 in non-DRX for 640 ms SCell measurement cycle

##### A.6.5.3.X2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.X1.1. The supported test configurations are the same as defined in clause A.6.5.3.X1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.X2.1-1 will replace the values of corresponding parameters in Tables A.6.5.3.X1.1-2 and the listed parameter values in Tables Table A.6.5.3.X2.1-2 will replace the values of corresponding parameters in Tables A.6.5.3.X1.1-3.

Table A.6.5.3.X2.1-1: General test parameters for known FR1 SCell activation case, 640 ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |

Table A.6.5.3.X2.1-2: Cell specific test parameters for known FR1 SCell activation case, 640ms SCell measurement cycle

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| gapBetweenBursts |  | slots | 2 | | | |

##### A.6.5.3.X2.2 Test Requirements

The test requirements defined in clause A.6.5.3.X1.2 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstATRS + Tgap + TATRS + 5ms.

<End of Change 11>

<Start of Change 12>

#### A.7.5.3.X1 SCell Activation for SCell in FR2 intra-band in non-DRX

##### A.7.5.3.X1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.X1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.X1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.X1.1-2 except those described in Tables A.7.5.3.X1.1-2, and cell specific test parameters are described in Tables A.7.5.3.X1.1-3. OTA related test parameters are shown in table A.7.5.3.X1.1-4 below.

Table A.7.5.3.X1.1-1: Supported test configurations for FR2 SCell activation case

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

Table A.7.5.3.X1.1-2: General test parameters for FR2 SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test, cell 1 and cell2 use RF channel 1 and 2, respectively. |

Table A.7.5.3.X1.1-3: Cell specific test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | | T1 | | T2 |
| SSB ARFCN |  | freq1 | | | freq2 | | |
| Duplex mode |  | TDD | | | | | |
| TDD configuration |  | TDDConf.3.1 | | | | | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | | | |
| TRS configuration |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | | | |
| Data RBs allocated |  | 66 | | 66 | | 66 | |
| 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 | | | | | |
| Aperiodic CSI-RS for Scell activation |  | TRS.2.3 TDD | | | | | |
| gapBetweenBursts | Slot | N/A | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | |
| CSI-RS configuration for CSI reporting |  | CSI-RS.3.1 TDD | | | | | |
| reportConfigType |  | periodic | | | N/A | | |
| reportQuantity |  | cri-RI-PMI-CQI | | | N/A | | |
| CSI reporting periodicity | slot | 40 | | | N/A | | |
| CSI reporting offset | slot | 4 | | | N/A | | |
| 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\_DMRS |  |  | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  | | | | | |
| Propagation conditions |  | 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.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | | |

Table A.7.5.3.X1.1-4: OTA related test parameters for FR2 SCell activation case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | Cell 2 | |
|  |  | T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  | Setup 1 according to table A.3.15.1 | | Setup 1 according to table A.3.15.1 | |
| Assumption for UE beams Note 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -104.7 | | -104.7 | |
| Note1 | dBm/SCSNote3 | -95.7 | | -95.7 | |
|  | dB | 7 | | 7 | |
| SSB\_RPNote2 | dBm/SCS Note4 | -88.7 | | N/A | |
| CSI\_RPNote2 | dBm/SCS Note4 | N/A | | -88.7 | |
|  | dB | 7 | | 7 | |
| IoNote2 | dBm/95.04 MHz Note4 | -58.92 | | -58.92 | |
| 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: Es/Iot, SSB\_RP, CSI\_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: Void  Note 6: Void  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | |

##### A.7.5.3.X1.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.X1 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstATRS + 5ms as defined in clause 8.3.16.

<End of Change 12>

<Start of Change 13>

#### A.7.5.3.X2 SCell Activation for known SCell in FR2 inter-band

##### A.7.5.3.X2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.X1 except the PCell and SCell are in FR2 inter-band, when the SCell in FR2 is known by the UE at the time of activation.

The supported test configurations are shown in table A.7.5.3.X2.1-1 below. The general test parameters are described in Tables A.7.5.3.X2.1-2, and cell specific test parameters are described in Tables A.7.5.3.X2.1-3. OTA related test parameters are shown in table A.7.5.3.X2.1-4 below.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. The UE now starts monitoring the SCell. The test equipment sends a MAC message for activation of the SCell triggering the aperiodic CSI-RS for fast SCell activation.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m (where m mode 20=1), defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot , as defined in clause 8.3.6. The UE shall start reporting CSI in PSCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot to slot , as defined in clause 8.3, where is the interruption length given in clause 8.2

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

Table A.7.5.3.X2.1-1: Supported test configurations for FR2 SCell activation in FR2 inter-band

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

Table A.7.5.3.X2.1-2: General test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤8 | A random value from 0μs to 8μs |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.7.5.3.X2.1-3: Cell specific test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | T1 | | T2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | | TCI.State.0 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| CSI-RS configuration |  | NA | NA | NA | CSI-RS.3.1 TDD Note 2 |
| CSI reporting periodicity Note 3 |  | NA | 5 | NA | 5 |
| OCNG Patterns |  | OP.1 | | | |
| SSB Configuration |  | SSB.1 FR2 | | | |
| SMTC Configuration |  | SMTC.1 | | | |
| Aperiodic CSI-RS for Scell activation |  | - | - | - | TRS.2.3 TDD |
| gapBetweenBursts | Slot | N/A | | 0 | |
| 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | 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.  Note 2: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | |

Table A.7.5.3.X2.1-4: OTA related test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | |
| **AoA1** | | **AoA2** | |
| Assumption for UE beams Note 7 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -92.1 | | -92.1 | |
| Note1 | dBm/SCSNote3 | -83.1 | | -83.1 | |
|  | dB | 0 | | 0 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | N/A | |
| CSI-RSRPNote2 | dBm/SCS Note4 | N/A | | -83.1 | |
|  | dB | 0 | | 0 | |
| IoNote2 | dBm/95.04 MHz Note4 | -51.1 | | -51.1 | |
| 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-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 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: All parameters apply for configuration 1  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | |

##### A.7.5.3.X2.2 Test Requirements

During T2 the UE shall start sending CSI report for the SCell in the configured slots for CSI reporting after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k). UE shall send the first CSI report for SCell after receiving at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k), or in the next available uplink resource for CSI reporting if the slot was subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2, the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

- THARQ is defined in Table A.7.5.3.X2.1-2

- Tactivation\_time = max(TFirstATRS + 5ms, Tuncertainty\_RRC + TRRC\_delay-THARQ)

- TCSI\_Reporting = 10ms

- NR slot length is 0.125ms for this test case.

During T2, the interruption of PCell during SCell activation shall not happen outside the slot to , where TX =4ms.

<End of Change 13>

<Start of Change 14>

#### A.7.5.X3 PSCell RACH-less based Activation and deactivation for FR1+FR2 inter-band with target PSCell in FR2

##### A.7.5.X3.1 Test Purpose and Environment

The purpose of this test case is to test the activation PSCell delay for a UE configured with one deactivated SCG in NR-DC and when PScell in one SCG is being activated. The test also tests the deactivation delay. The test case tests the requirements within which the UE shall be able to activate the deactivated SCG in section 8.17.2 for RACH-less based conditions when PSCell and TCI state are known. The PCell is in NR FR1 and the PSCell is in NR FR2.

The supported test configurations are defined in Table A.7.5.X3.1-1. And cell specific test parameters are described in Tables A.7.5.X3.1-2. OTA related test parameters are defined in Table A.7.5.X3.1-3.

At the beginning of T1 the UE is configured with a PSCell which is activated. At T1 the PSCell is deactivated. PSCell is configured with *bfd-and-RLM* with value *true*.

An RRC message for activation of PSCell is sent by the test equipment 1s after the RRC message deactivating the PSCell, in a slot # denoted m. The point in time at which the RRC message for activation of PSCell is received at the UE defines the start of time period T2.

During T2, the test equipment monitors for SR from the UE on the PSCell. The time when test equipment receives a scheduling request from the UE is denoted as slot T3.

Time period T4 starts when a RRC message for deactivation of the PSCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of the PSCell, respectively.

The test equipment verifies the activation time by when the SR from the UE is received in the activated PSCell.

The test equipment verifies the deactivation time by counting the slots from the time when the PSCell deactivation command is sent until UL transmission from the PSCell is discontinued.

**Table A.7.5.X3.1-1: Supported test configurations for FR2 PSCell activation case**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

Table A.7.5.X3.1-2: Cell specific test parameters for FR2 PSCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | Cell 1 | | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | | T1 | T2 | T3 | T4 |
| SSB ARFCN | |  | Freq1 | | | | | Freq2 | | | |
| Duplex mode | Config 1 |  | FDD | | | | | TDD | | | |
| Config 2,3 |  | TDD | | | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | | TDDConf.3.1 | | | | |
| Config 2 | TDDConf.1.1 | | | |
| Config 3 | TDDConf.2.1 | | | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | | | | |
| TRS configuration | Config 1,2,3 |  | N/A | | | | | TRS.2.1 TDD | | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | | 100: NRB,c = 66 | | | |
| Config 3 | 40: NRB,c = 106 | | | | |
| Data RBs allocated | Config 1,2 |  | 52 | 66 | 66 | 52 | | 66 | 52 | 52 | 66 |
| Config 3 | 106 | 106 | | 106 | 106 |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | | - | | | |
| Config 2 |  | SR.1.1 TDD | | | | |
| Config 3 |  | SR.2.1 TDD | | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | | - | | | |
| Config 2 |  | CR.1.1 TDD | | | | |
| Config 3 |  | CR.2.1 TDD | | | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | | | - | | | |
| Config 2 | CCR.1.1 TDD | | | | |
| Config 3 | CCR.2.1 TDD | | | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | | SSB.3 FR2 | | | |
| Config 3 | SSB.2 FR1 | | | | |
| CSI-RS configuration for CSI reporting | Config 1~3 |  | N/A | | | | | CSI-RS.3.1 TDD | | | |
| reportConfigType for CSI reporting |  |  | periodic | | | | | N/A | | | |
| reportConfigType for L1-RSRP |  |  | periodic | | | | | N/A | | | |
| reportQuantity for CSI reporting |  |  | cri-RI-PMI-CQI | | | | | N/A | | | |
| reportQuantity for L1-RSRP |  |  | ssb-Index-RSRP | | | | | N/A | | | |
| CSI reporting periodicity | Config 1,2 | slot | 5 | | | | | N/A | | | |
| Config 3 | 10 | | | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 | slot | 5 | | | | | N/A | | | |
| Config 3 | 10 | | | | |
| CSI reporting offset | Config 1,2 | slot | 2 | | | | | N/A | | | |
| Config 3 | 4 | | | | |
| L1-RSRP reporting offset | Config 1,2 | slot | 2 | | | | | N/A | | | |
| Config 3 | 4 | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | | | | |
| 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\_DMRS | |  |  | | | | | | | | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |  |  | | | | | | | | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  | | | | | | | | |
| Propagation conditions | |  | N/A  Link only, see clause A.3.7A | | | | AWGN | | | | |
| Scheduling request resource priodicity | | ms | N/A | | | | 20 | | | | |
| 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: Void  Note 4: Void  Note 5: All parameters apply for configuration 1, 2 and 3  Note 6: Void.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | | |

Table A.7.5.X3.1.1-3: OTA related test parameters for FR1 PCell with FR2 PSCell activation case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| Angle of arrival configuration | |  | N/A | | | | According to clause A.3.15.1 | | | |
| Assumption for UE beams Note 7 | |  | N/A | | | | Rough | | | |
| Note 1 | Config 1,2,3 | dBm/15kHz | Link only, see clause A.3.7A | | | | -104.7 | | | |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | | | |
|  | Config 1,2,3 | dB | 7 | | | |
|  | Config 1,2,3 | dB | 7 | | | |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -88.7 | | | |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -58.92 | | | |
| 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: Es/Iot, 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: Void  Note 6: Void  Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. | | | | | | | | | | |

A.7.5.3.2.2 Test Requirements

During T2 the UE shall send the first SR on PSCell in the first available uplink SR resource no later than T3 which is:

TRRC\_delay + Tprocessing + Tsearch + T∆ + TIU + 2 ms

as defined on section 8.17.2. In this test case:

* Tprocessing = 5ms (no RRC parameter has been modified),
* Tsearch = 0ms (RACH-less based PSCell activation, with RLM and BFD are configured, PSCell and TCI state are known), and
* T∆ = 20ms.

This allows T3 of [TRRC\_delay + TIU + 27]ms

During T4 the UE shall stop all transmissions on the PSCell no later than in slot as defined in 8.17.3.

During T2 the interruption of PCell during PSCell activation shall not happen outside the slot *m + TRRC\_delay*.

During T4 the interruption of PCell during PSCell deactivation shall not happen outside the slot *n + TRRC\_delay*.

The interruption duration on PCell due to activation and deactivation of PSCell shall not be more than the values specified for in Clause 8.17.2 and 8.17.3.

<End of Change 14>

<Start of Change 15>

### A.7.5.X4 Conditional PSCell addition and release delay (FR2 SA)

#### A.7.5.X4.1 Addition and Release Delay of PSCell

##### A.7.5.X4.1.1 Test purpose and environment

The purpose of this test is to verify that the conditional PSCell addition and release delays under SA are within the requirements stated in clause 8.9A.2.

##### A.7.5.X4.1.2 Test Parameters

The supported test configurations are given in Table A.7.5.X3.1.2-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.X4.1.2-2 and A.7.5.X4.1.2-3 below. The test consists of four successive time periods, with time durations of T1, T2, T3, T4, respectively.

At the start of time duration T1, the UE does not have any timing information of cell 2. NR shall configure a condition implying addition to cell 2 during T1, at a time earlier than TRRC before the beginning of T2.

At the start of T2, cell 2 becomes detectable and meets the addition condition. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send an RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.7.5.X4.1.2-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Config | Description |
| 1 | FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| 2 | FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| 3 | FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.5.X4.1.2-2: General test parameters for conditional PSCell addition and release delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test |
| Active PCell | |  | Cell 1 | PCell on RF channel number 1 in FR1 |
| Neighbour cell | |  | Cell 2 | Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2 |
| A4 | Hysteresis | dB | 0 | Hysteresis for event A4 |
|  | Threshold RSRP | dBm | -118 | Threshold for event A4 |
|  | Time to Trigger | S | 0 | Time to trigger for event A4 |
| DRX | |  | OFF | For both PCell and PSCell once activated |
| Measurement gap pattern ID | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration in Cell 2 | |  | FR2 PRACH configuration 2 | PRACH configuration as specified in Clause A.3.8.3.2. |
| CSI reporting periodicity and offset configuration for Cell 2 | | ms | 2 |  |
| T1 | | s | 5 | During this time the PCell is known and Cell 2 is unknown. |
| T2 | | s | ≤7 | During this time Cell 2 meets the addition condition and UE adds this PSCell. |
| T3 | | s | 1 | During this time the UE sends CSI reports for Cell 2. |
| T4 | | s | 1 | During this time the UE releases the Cell 2. |

Table A.7.5.X4.1.2-3: NR Cell specific test parameters for conditional PSCell addition and release delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell2 | | | |
|  |  |  |  | T1 | T2 | T3 | T4 |
| Frequency Range |  | 1,2,3 | FR1 | FR2 | | | |
| Duplex mode |  | 1 | FDD | TDD | | | |
|  |  | 2,3 | TDD |  | | | |
| TDD configuration |  | 1 | – | TDDConf.3.1 | | | |
|  |  | 2 | TDDConf.1.1 |  | | | |
|  |  | 3 | TDDConf.2.1 |  | | | |
| BWchannel | MHz | 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 | | | |
|  |  | 3 | 40: NRB,c = 106 |  | | | |
| Data RBs allocated |  | 1,2 | 52 | 48 | | | |
| 3 | 106 |
| Initial Downlink BWP configuration |  | 1,2,3 | DLBWP.0.1 | DLBWP.0.1 | | | |
| Initial Uplink BWP configuration |  | 1,2,3 | ULBWP.0.1 | ULBWP.0.1 | | | |
| Dedicated Downlink BWP configuration |  | 1,2,3 | DLBWP.1.1 | DLBWP.1.1 | | | |
| Dedicated Uplink BWP configuration |  | 1,2,3 | ULBWP.1.1 | ULBWP.1.1 | | | |
| PDSCH Reference Measurement Channel |  | 1 | SR.1.1 FDD | SR.3.3 TDD | | | |
|  |  | 2 | SR.1.1 TDD |  | | | |
|  |  | 3 | SR.2.1 TDD |  | | | |
| TRS configuration |  | 1,2,3 | – | TRS.2.1 TDD | | | |
| TCI state |  | 1,2,3 | – | TCI.State.0 | | | |
| RMSI CORESET parameters |  | 1 | CR.1.1 FDD | CR.3.2 TDD | | | |
|  |  | 2 | CR.1.1 TDD |  | | | |
|  |  | 3 | CR.2.1 TDD |  | | | |
| Dedicated CORESET parameters |  | 1 | CCR.1.1 FDD | CCR.3.7 TDD | | | |
|  |  | 2 | CCR.1.1 TDD |  | | | |
|  |  | 3 | CCR.2.1 TDD |  | | | |
| OCNG PatternsNote1 |  | 1,2,3 | OP.1 | OP.3 | | | |
| SSB configuration |  | 1,2 | SSB.1 FR1 | SSB.2 FR2 | | | |
|  |  | 3 | SSB.2 FR1 |
| SMTC configuration |  | 1,2,3 | SMTC.2 | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 15 | 120 | | | |
| 3 | 30 |
| EPRE ratio of PSS to SSS | dB | 1,2,3 | 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 |  |  |  |  | | | |
| EPRE ratio of OCNG to OCNG DMRS |  |  |  |  | | | |
| Propagation Condition |  | 1,2,3 | N/A | 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.X4.1.2-4: OTA related test parameters for conditional PSCell addition and release delay

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 | | | | |
| T1 | | T2 | T3 | T4 |
| Angle of arrival configuration |  | 1,2,3 | Link only, see clause A.3.7A | Setup 2a according to clause A.3.15.2.1 | | | | |
| Assumption for UE beams Note 3 |  |  | Rough | | | | |
| Ês | dBm/SCS | 1,2,3 | -∞ | -81 | | | |
| SSB\_RP Note1, Note2 | dBm/SCS | 1,2,3 | -∞ | -81 | | | |
| BB Note1, Note 4 | dB | 1,2,3 | -∞ | 4.88 | | | |
| Io Note 1, Note2 | dBm/95.04 MHz | 1,2,3 | N/A | -56.41 | | | |
| Note 1: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.  Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 4: 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 ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

##### A.7.5.X4.2.3 Test Requirements

TRRC\_delay + TEvent\_DU occurs during T1 as the addition condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than Tmeasure + TUE\_preparation + Tprocessing + T∆ + TPSCell\_ DU + 2 ms = 6720+10+62ms=6792 ms (power class 1) or 4160+10+62ms =4232ms (power classes 2,3 and 4) from the start of T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T4.

All of the above test requirements shall be fulfilled in order for the observed conditional PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

<End of Change 15>