**3GPP TSG-RAN4 Meeting #98bis-e *R4-2105722***

**Electronic Meeting, April 12-20 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **DraftCR** | **rev** | **1** | **Current version:** | **16.7.0** |  |
|  | | | | | | | | |
| *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:*** | Test cases on BWP switching for NR-U SA in 38.133 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_unlic-Perf | | | | |  | ***Date:*** | | | 2021-04-16 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  | |  | | | | | | | | |
| ***Reason for change:*** | | To specify test cases for verifying the active BWP switching delay and interruption requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The following test cases for verifying the active BWP switching delay and interruption requirements are specified.   * Test cases for DCI-based and timer-based active BWP switching in EN-DC. * Test case for RRC-based active BWP switching in EN-DC. * Test cases for DCI-based and timer-based active BWP switching in SA case (NR PCell). * Test case for RRC-based active BWP switching in SA case (NR PCell).   The test cases are applicable for the UE which supports NR band with shared access (i.e. NR-U band(s) only). | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The UE capable only bands with shared access cannot verify the active BWP switching requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.10.3.5.2, A.10.3.5.2.1, A.10.3.5.2.2, A.10.3.5.3, A.10.3.5.3.1, A.14.4.5.2, A.14.4.5.2.1, A.14.4.5.2.2, A.14.4.5.3, A.14.4.5.3.1. | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**----------------------START OF CHANGES----------------------------**

#### A.10.3.5.2 DCI-based and Timer-based Active BWP Switch

##### A.10.3.5.2.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.10.3.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.32.2.7. Supported test configurations are shown in Table A.10.3.5.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.10.3.5.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.10.3.5.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

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

- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 in PSCell.

- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1\_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell’s slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after DL slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PSCell’s BWP-2 starting from the beginning of the DL slot right after DL slot (*i+TBWPswitchDelay*).

The starting time of PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the beginning slot of the DL subframe immediately after the *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell’s DL slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after DL slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PSCell’s BWP-1 starting from the beginning of the DL slot right after DL slot (*j+TBWPswitchDelay*).

The starting time of PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of PSCell, respectively.

Table A.10.3.5.2.1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: A UE which fulfils the requirements in test case A.10.3.5.2.2 can skip the test cases in A.10.3.5.2.1.  Note 3: The UE supporting EN-DC with only NR band(s) with shared spectrum access is required to be test. | |

Table A.10.3.5.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | For both PCell and PSCell |
| DL CCA model |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model |  | As specified in clause A.3.20.2.2 |  |
| *bwp-InactivityTimer* | ms | [200] |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| T1 | s | [0.2] |  |
| T2 | s | [0.2] |  |
| T3 | s | [0.2] |  |

**Table A.10.3.5.2.1.1-3.: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 |
| Frequency Range | | |  | FR1 |
| Duplex mode | | Config 1,2 |  | TDD |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | | Config 1,2 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | |  | 1, 2 |
| Initial DL BWP Configuration | | Config 1,2 |  | DLBWP.0.2 Note 4 |
| Active DL BWP-1 Configuration | | Config 1,2 |  | DLBWP.1.1 Note 4 |
| Active DL BWP-2 Configuration | | Config 1,2 |  | DLBWP.1.3 Note 4 |
| Initial UL BWP Configuration | | Config 1,2 |  | ULBWP.0.2 Note 4 |
| Active UL BWP-1 Configuration | | Config 1,2 |  | ULBWP.1.1 Note 4 |
| Active UL BWP-2 Configuration | | Config 1,2 |  | ULBWP.1.3 Note 4 |
| PDSCH Reference measurement channel | | Config 1,2 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | Config 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | Config 1,2 |  | CCR.1.1 CCA |
| OCNG Patterns | | Config 1,2 |  | OP.1 |
| SSB Configuration | Semi- static channel acces | Config 1,2 |  | SSB.1 CCA |
| Dymamic channel acces | Config 1,2 |  | SSB.2 CCA |
| SMTC Configuration | | Config 1,2 |  | SMTC.1 |
| TRS Configuration | | Config 1,2 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | Config 1,2 |  | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1,2 |  | 1 |
| 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 | | Config 1,2 | dBm/SCS | [-101] |
| SS-RSRP Note 3 | | Config 1,2 | dBm/SCS | [-84] |
| Ês/Iot | | Config 1,2 | dB | 17 |
| Ês/Noc | | Config 1,2 | dB | 17 |
| IoNote3 | | Config 1,2 | dBm/38.16MHz | [-59] |
| 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 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 themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | |

A.10.3.5.2.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot (*i+TBWPswitchDelay*+*k1*).

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot (*j+TBWPswitchDelay*+*k1*).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration *TBWPswitchDelay* defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

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

During T1, the start time of PCell interruption during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of PCell interruption of during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.32.2.7.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

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

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot (*i+TBWPswitchDelay*+*k1*), (*j+TBWPswitchDelay*+*k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

##### A.10.3.5.2.2 E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC

A.10.3.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirements for NR victim cell defined in clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [15]. Supported test configurations are shown in Table A.10.3.5.2.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one NR PSCell (Cell 2) and one NR SCell (Cell 3) as given in Table A.10.3.5.2.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCell are specified in Table A.10.3.5.2.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) and SCell (Cell 3) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).

- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 3 before starting the test.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 in PSCell.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-0 in SCell.

- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1\_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell’s slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PSCell’s BWP-2 starting from the beginning of the DL slot right after slot (*i+TBWPswitchDelay*).

PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell’s DL slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PSCell’s BWP-1 starting from the beginning of the DL slot right after slot (*j+TBWPswitchDelay*).

PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell and NR SCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell and SCell during BWP switch of PSCell, respectively.

Table A.10.3.5.2.2.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: A UE which fulfils the requirements in test case A.10.3.5.2.2 can skip the test cases in A.10.3.5.2.1.  Note 3: NR configuration is the same for PSCell and SCells.  Note 4: The UE supporting EN-DC with only NR band(s) with shared spectrum access is required to be tested. | |

Table A.10.3.5.2.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2, 3 | Two NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| Active SCell |  | Cell 3 | SCell on RF channel number 3. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| DL CCA model |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model |  | As specified in clause A.3.20.2.2 |  |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| Cell3 timing offset to cell2 | μs | 3 | Synchronous cells |
| T1 | s | [0.2] |  |
| T2 | s | [0.2] |  |
| T3 | s | [0.2] |  |

Table A.10.3.5.2.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | Cell 3 |
| Frequency Range | | |  | FR1 | |
| Duplex mode | | Config 1,2 |  | TDD | |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1,2 |  | 40 MHz: NRB,c = 106 | |
| Active BWP ID | | |  | 1, 2 | 0 |
| Initial BWP Configuration | | Config 1,2 |  | DLBWP.0.2 | DLBWP.0.2 |
| Active BWP-0 Configuration | | Config 1,2 |  | NA | DLBWP.0.2 |
| Active BWP-1 Configuration | | Config 1,2 |  | DLBWP.1.3 | NA |
| Active BWP-2 Configuration | | Config 1,2 |  | DLBWP.1.1 | NA |
| PDSCH Reference measurement channel | | Config 1,2 |  | SR.1.1 CCA | |
| RMSI CORESET parameters | | Config 1,2 |  | CR.1.1 CCA | |
| Dedicated CORESET parameters | | Config 1,2 |  | CCR.1.1 CCA | |
| OCNG Patterns | | Config 1,2 |  | OP.1 | |
| SSB Configuration | Semi- static channel acces | Config 1,2 |  | SSB.1 CCA | |
| Dymamic channel acces | Config 1,2 |  | SSB.2 CCA | |
| SMTC Configuration | | Config 1,2 |  | SMTC.1 | |
| TRS Configuration | | Config 1,2 |  | TRS.1.2 TDD | |
| DL CCA probability (PCCA\_DL) | | Config 1,2 |  | 1 | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1,2 |  | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 | |
| Propagation Condition | | |  | AWGN | |
| 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 | 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 | | Config 1,2 | dBm/SCS kHz | [-101] | [-101] |
| SS-RSRP Note 3 | | Config 1,2 | dBm/SCS kHz | [-84] | [-84] |
| Ês/Iot | | Config 1,2 | dB | 17 | 17 |
| Ês/Noc | | Config 1,2 | dB | 17 | 17 |
| IoNote3 | | Config 1,2 | dBm/38.16MHz | [-59] | [-59] |
| 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 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 themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | | |

A.10.3.5.2.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after slot (*i+TBWPswitchDelay+k1*).

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after slot (*j+TBWPswitchDelay+k11*).

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

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

During T1, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 7.32.2.7 of TS 36.133 [15].

During T1, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

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

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after slot (*i+TBWPswitchDelay+k1*), (*j+TBWPswitchDelay+k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

*Editor’s note: FFS value of k1 for type 1 and type 2 UE.*

#### A.10.3.5.3 RRC-based Active BWP Switch

A.10.3.5.3.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.10.3.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.10.3.5.3.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2) as given in Table A.10.3.5.3.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell are specified in Table A.10.3.5.3.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

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

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PSCell).

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PSCell’s slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell’s DL slot (*i+TRRCprocessingDelay+TBWPswitchDelayRRC*) as defined in clause 8.6.3 and be ready for the reception of uplink grant for the PSCell no later than at the beginning of the DL slot right after slot (*i+TRRCprocessingDelay+TBWPswitchDelayRRC*). The UE shall be continuously scheduled on PSCell’s BWP-1 starting from the beginning of the DL slot right after slot (*i+TRRCprocessingDelay+TBWPswitchDelayRRC*).

*TRRCprocessingDelay* and *TBWPswitchDelayRRC* are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configurationis sent till the time when RRC Reconfiguration Complete message is received.

Table A.10.3.5.3.1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: The UE supporting EN-DC with only NR band(s) with shared spectrum access is required to be tested. | |

**Table A.10.3.5.3.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| DL CCA model |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model |  | As specified in clause A.3.20.2.2 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| T1 | s | [0.2] |  |

Table A.10.3.5.3.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 2 |
| Frequency Range | | | |  | FR1 |
| Duplex mode | | | Config 1,2 |  | TDD |
| TDD configuration | | | Config 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | | | Config 1,2 |  | 40 MHz: NRB,c = 106 |
| Active DL BWP ID | | | |  | 1, 2 |
| Initial DL BWP Configuration | | | Config 1,2 |  | DLBWP.0.2 |
| Initial UL BWP Configuration | | | Config 1,2 |  | ULBWP.0.2 |
| Initial Condition | | Active DL BWP-1 Configuration | Config 1,2 |  | DLBWP.1.3 |
| Final Condition | | Active DL BWP-1 Configuration | Config 1,2 |  | DLBWP.1.1 |
| Initial UL BWP Configuration | | | Config 1,2 |  | ULBWP.0.2 |
| Active UL BWP-1 Configuration | | | Config 1,2 |  | ULBWP.1.3 |
| Active UL BWP-2 Configuration | | | Config 1,2 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | | Config 1,2 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | | Config 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | | Config 1,2 |  | CCR.1.1 CCA |
| OCNG Patterns | | | Config 1,2 |  | OP.1 |
| SSB Configuration | Semi- static channel acces | | Config 1,2 |  | SSB.1 CCA |
| Dymamic channel acces | | Config 1,2 |  | SSB.2 CCA |
| SMTC Configuration | | | Config 1,2 |  | SMTC.1 |
| TRS Configuration | | | Config 1,2 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | | Config 1,2 |  | 1 |
| UL CCA probability (PCCA\_UL) | | | Config 1,2 |  | 1 |
| Antenna Configuration | | | |  | 1x2 |
| Propagation Condition | | | |  | AWGN |
| 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 | | | Config 1,2 | dBm/SCS kHz | [-101] |
| SS-RSRP Note 3 | | | Config 1,2 | dBm/SCS kHz | [-84] |
| Ês/Iot | | | Config 1,2 | dB | 17 |
| Ês/Noc | | | Config 1,2 | dB | 17 |
| IoNote3 | | | Config 1,2 | dBm/38.16MHz | [-59] |
| 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 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 themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | | |

A.10.3.5.3.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell in the beginning of the DL slot right after slot (*i+ TRRCprocessingDelay+TBWPswitchDelayRRC* ).

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

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

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

**----------------------NEXT CHANGE----------------------------**

A.11.4.5.2 DCI-based and Timer-based Active BWP Switch

A.11.4.5.2.1 NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA

A.11.4.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.11.4.5.2.1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.11.4.5.2.1.1-2. NR Cell-specific parameters are specified in Table A.11.4.5.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

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

- UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 2 before starting the test.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 in PCell.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-0 in SCell.

- UE is configured with a *bwp-InactivityTimer* timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1\_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell’s slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than the first UL slot that occurs after the beginning of slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PCell’s BWP-2 no later than the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on PCell (Cell 1).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell’s slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PCell’s BWP-1 no later than the first DL slot that occurs after the beginning of slot (*j+TBWPswitchDelay*).

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

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

**Table A.11.4.5.2.1.1-1: DL BWP switch supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | With CCA: 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 supporting SA operation with only NR band(s) with shared spectrum access is required to be tested. | |

**Table A.11.4.5.2.1.1-2: General test parameters for DL BWP switch in SA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1, 2 | Two NR radio channels are used in this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active SCell |  | Cell 2 | SCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | For both PCell and SCell |
| DL CCA model |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model |  | As specified in clause A.3.20.2.2 |  |
| *bwp-InactivityTimer* | ms | 200 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC. |
| Cell2 timing offset to cell1 | μs | 3 | Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

**Table A.11.4.5.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** | **Cell2** |
| Frequency Range | | |  | FR1 | |
| Duplex mode | | Config 1 |  | TDD | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1 |  | 40 MHz: NRB,c = 106 | |
| Active BWP ID | | |  | 1, 2 | 0 |
| Initial DL BWP Configuration | | |  | DLBWP.0.2Note4 | |
| Initial UL BWP Configuration | | |  | ULBWP.0.2Note4 | |
| Active DL BWP-0 Configuration | | |  | N.A. | DLBWP.0.2Note4 |
| Active DL BWP-1 Configuration | | |  | DLBWP.1.1Note4 | N.A. |
| Active DL BWP-2 Configuration | | |  | DLBWP.1.3Note4 | N.A. |
| Active UL BWP-0 Configuration | | |  | N.A. | ULBWP.0.2Note4 |
| Active UL BWP-1 Configuration | | |  | ULBWP.1.1Note4 | N.A. |
| Active UL BWP-2 Configuration | | |  | ULBWP.1.3Note4 | N.A. |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA | |
| RMSI CORESET parameters | | Config 1 |  | CR.1.1 CCA | |
| Dedicated CORESET parameters | | Config 1 |  | CCR.1.1 CCA | |
| OCNG Patterns | | |  | OP.1 | |
| SSB Configuration | Semi- static channel acces | Config 1 |  | SSB.1 CCA | |
| Dymamic channel acces | Config 1 |  | SSB.2 CCA | |
| SMTC Configuration | | Config 1 |  | SMTC.1 | |
| DL CCA probability (PCCA\_DL) | | Config 1 |  | 1 | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1 |  | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 Low | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |
| NocNote 2 | | Config 1 | dBm/SCS | -101 | -101 |
| SS-RSRP Note 3 | | Config 1 | dBm/SCS | -84 | -84 |
| Ês/Iot | | Config 1 | dB | 17 | 17 |
| Ês/Noc | | Config 1 | dB | 17 | 17 |
| IoNote3 | | Config 1 | dBm/38.16MHz | -52.86 | -52.86 |
| Propagation Condition | | |  | AWGN | 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 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 themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | | |

A.11.4.5.2.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*i+TBWPswitchDelay*+*k1*).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*j+TBWPswitchDelay*+*k1*).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration *TBWPswitchDelay* defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

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

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

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

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first DL slot that occurs after the beginning of DL slot (*i+ TBWPswitchDelay*+*k1*), (*j+ TBWPswitchDelay*+*k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.11.4.5.2.2 NR FR1 DL active BWP switch with non-DRX in SA

A.11.4.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.

The supported test configurations are shown in Table A.11.4.5.2.2.1-1. The test scenario comprises of one cell (Cell 1) as given in Table A.11.4.5.2.2.1-2. Cell-specific parameters of the cell are specified in Table A.11.4.5.2.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.

- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1.

- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

The cell has constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1\_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell1’s slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 no later than the first UL slot that occurs after the beginning of slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on Cell1’s BWP-2 starting from the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

During T2, the test equipment won’t transmit DCI format for PDSCH reception on Cell1.

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1’s slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on Cell1’s BWP-1 starting from the first DL slot that occurs after the beginning of slot (*j+TBWPswitchDelay*).

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

**Table A.11.4.5.2.2.1-1: DL BWP switch supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | With CCA: 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: A UE which fulfils the requirements in test case A.11.4.5.2.1 can skip the test cases in A.11.4.5.2.2.  Note 3: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested. | |

**Table A.11.4.5.2.2.1-2: General test parameters for DL BWP switch in SA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** | |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test | |
| Active Cell |  | Cell 1 | Cell1 on RF channel number 1. | |
| CP length |  | Normal |  | |
| DRX |  | OFF |  | |
| DL CCA model |  | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | As specified in clause A.3.20.2.2 | |  |
| *bwp-InactivityTimer* | ms | 200 |  | |
| T1 | s | 0.2 |  | |
| T2 | s | 0.2 |  | |
| T3 | s | 0.2 |  | |

**Table A.11.4.5.2.2.1-3: NR Cell specific test parameters for DL BWP switch in SA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** |
| Frequency Range | | |  | FR1 |
| Duplex mode | | Config 1 |  | TDD |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA |
| BWchannel | | Config 1 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | |  | 1, 2 |
| Initial DL BWP Configuration | | Config 1 |  | DLBWP.0.2 Note 4 |
| Active DL BWP-1 Configuration | | Config 1 |  | DLBWP.1.1 Note 4 |
| Active DL BWP-2 Configuration | | Config 1 |  | DLBWP.1.3 Note 4 |
| Initial UL BWP Configuration | | Config 1 |  | ULBWP.0.2 Note 4 |
| Active UL BWP-1 Configuration | | Config 1 |  | ULBWP.1.1 Note 4 |
| Active UL BWP-2 Configuration | | Config 1 |  | ULBWP.1.3 Note 4 |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | Config 1 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | Config 1 |  | CCR.1.1 CCA |
| OCNG Patterns | | |  | OP.1 |
| SSB Configuration | Semi- static channel acces | Config 1 |  | SSB.1 CCA |
| Dymamic channel acces | Config 1 |  | SSB.2 CCA |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 Low |
| TRS Configuration | | Config 1 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | Config 1 |  | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1 |  | 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 | | |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |
| NocNote 2 | | Config 1 | dBm/SCS | -101 |
| SS-RSRP Note 3 | | Config 1 | dBm/SCS | -84 |
| Ês/Iot | | Config 1 | dB | 17 |
| Ês/Noc | | Config 1 | dB | 17 |
| IoNote3 | | Config 1 | dBm/38.16 MHz | -52.86 |
| Propagation Condition | | |  | AWGN |
| Note 1: OCNG shall be used such that the resources in Cell 1 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 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 themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | |

A.11.4.5.2.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*i+TBWPswitchDelay*+*k1*).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*j+TBWPswitchDelay*+*k1*).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration *TBWPswitchDelay* defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed Cell1 active BWP switch delay to be counted as correct.

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

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after beginning of DL slot (*i+TBWPswitchDelay*+*k1*), (*j+TBWPswitchDelay*+*k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.11.4.5.3 RRC-based Active BWP Switch

A.11.4.5.3.1 NR FR1 DL active BWP switch of Cell with non-DRX in SA

A.11.4.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.

The supported test configurations are shown in Table A.11.4.5.3.1.1-1. The test scenario comprises of one Cell (Cell 1) as given in Table A.11.4.5.3.1.1-2. Cell-specific parameters of Cell are specified in Table A.11.4.5.3.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition in Cell 1.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PCell’s slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot on BWP-1 of final condition. The UE shall be continuously scheduled on PCell’s BWP-1 of final condition starting from the first DL slot right after slot .

TRRCprocessingDelay and TBWPswitchDelayRRC are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in Cell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received is received.

**Table A.11.4.5.3.1.1-1: DL BWP switch supported test configurations in SA scenario**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | With CCA: 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 supporting SA operation with only NR band(s) with shared spectrum access is required to be tested. | |

**Table A.11.4.5.3.1.1-2: General test parameters for DL BWP switch in SA scenario**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active Cell |  | Cell 1 | Cell on RF channel number 1. |
| CP length |  | Normal |  |
| DL CCA model |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model |  | As specified in clause A.3.20.2.2 |  |
| DRX |  | OFF |  |
| T1 | s | 0.2 |  |

**Table A.11.4.5.3.1.1-3: NR Cell specific test parameters for DL BWP switch in SA scenario**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Cell 1** |
| Frequency Range | | | |  | FR1 |
| Duplex mode | | | Config 1 |  | TDD |
| TDD configuration | | | Config 1 |  | TDDConf.1.1 CCA |
| BWchannel | | | Config 1 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | | |  | 1 |
| Initial DL BWP Configuration | | | Config 1 |  | DLBWP.0.2 |
| Initial UL BWP Configuration | | | Config 1 |  | ULBWP.0.2 |
| Initial Condition | Active DL BWP-1 Configuration | | Config 1 |  | DLBWP.1.3 |
| Active UL BWP-1 Configuration | | Config 1 |  | ULBWP.1.3 |
| Final  Condition | Active DL BWP-1 Configuration | | Config 1 |  | DLBWP.1.1 |
| Active UL BWP-1 Configuration | | Config 1 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | | Config 1 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | | Config 1 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | | Config 1 |  | CCR.1.1 CCA |
| OCNG Patterns | | | |  | OP.1 |
| SSB Configuration | | Semi-static channel acces | Config 1 |  | SSB.1 CCA |
| Dymamic channel acces | Config 1 |  | SSB.2 CCA |
| SMTC Configuration | | | |  | SMTC.1 |
| TRS Configuration | | | Config 1 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | | Config 1 |  | 1 |
| UL CCA probability (PCCA\_UL) | | | Config 1 |  | 1 |
| Propagation Condition | | | |  | AWGN |
| 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) | | | |  |  |
| NocNote 2 | | | Config 1 | dBm/SCS | -101 |
| SS-RSRP Note 3 | | | Config 1 | dBm/SCS | -84 |
| Ês/Iot | | | Config 1 | dB | 17 |
| Ês/Noc | | | Config 1 | dB | 17 |
| IoNote3 | | | Config 1 | dBm/38.16MHz | -52.86 |
| 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 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 themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | | |

A.11.4.5.3.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for the Cell from the first DL slot that occurs right after the begining of slot and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed Cell active BWP switch delay to be counted as correct.

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

**----------------------END OF CHANGES----------------------------**