**3GPP TSG-RAN WG4 Meeting #100-e *R4-2115465***

**Electronic Meeting, 16th Aug. – 27th Aug. 2021**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** |  | **rev** |  | **Current version:** | **17.2.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Big CR to TS 38.133: NR\_unlic maintenance Part 2 (Rel-17) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MCC, vivo | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_unlic-Pref | | | | |  | ***Date:*** | | | 2021-08-30 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | A |  | | | | | ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This big CRs merge the mutile endorsed draf CRs. The reason for change in each endorsed draft CR is copied below.  R4-2113465 Draft CR: Correction of RMC for NR-U test cases  SNR test points of NR-U RLM/BFD test cases for 4Rx UEs are TBD  R4-2114106 CR on TC of cell reselection for NR-U R17   1. According to the S criteria in TS 38.304, UE may choose not to perform cell intra-frequency reselection when Srxlev> SIntraSearchP. According to current configuration, Srxlev is calculated as 55 dB > intraSearchP(50dB), which means the test can not be conduced. 2. SintrasearchP and SnonintrasearchP should be configured for both Cell 1 and Cell2. 3. SMTC configuration should be provided. 4. The note should be added to state that the UE is only required to be tested in one of the supported test configurations. 5. Io is not correct which could not be –infinity 6. Es/Iot in A.11.1.3.1.2-3 is not defined 7. Typos are fixed   R4-2114108 CR on TC of HO for NR-U R17   1. Dedicated CORESET RMC configuration is missing in A.11.2.1.1 to A.11.2.1.8 2. RMSI CORESET RMC configuration is TBD in A.11.2.1.6 to A.11.2.1.8 3. The DL CCA probability and UL CCA probability are not aligned with the lastest agreements. in A.11.2.1.4 to A.11.2.1.8 4. The CCA model is not defined for LBE and FBE in A.11.2.1.5 5. PRACH configuration is not defined for CCA operation 6. The note should be added to state that the UE is only required to be tested in one of the supported test configurations 7. CCA probability, PRACH configuration is not defined in A.12.2.1.1 8. Noc configuration in A.12.2.1.1 is not correct 9. According to the agreements in RAN4#99e, the applicability rule should be added for HO from NR-U to E-UTRA 10. Typos need to be fixed   R4-2113231 Draft CR Correction of Handover TCs  Update Handover TCs with CCA according to the agreements from the pervious RAN4 meeting.  R4-2114434 Correction to RRC re-establishment tests for NR-U in 38.133  To correct parameters in the test cases verifying the RRC re-establishment requirements for carrier subject to CCA.  R4-2113233 Draft CR RRC Re-establishment with CCA  Correction of RRC re-establishment TCs  R4-2114436 Correction to RRC re-direction tests for NR-U in 38.133  To correct parameters in the test cases verifying the RRC re-direction requirements for carrier subject to CCA.  R4-2114112 CR on TC of RRC Release with Redirection for NR-U R17   1. DL and UL CCA probability configurations are missing in A.11.2.2.3.2 2. Dedicated CORESET RMC are not defined in A.11.2.2.3.1/2 3. Typos need to be fixed   R4-2113469 Draft CR: Correction of random access procedure test cases for NR-U  Parameter values are in square brackets  R4-2114116 CR on TC of timing requirements for NR-U R17   1. The TDD configuration, PDSCH RMC, CORSET RMC, TRS configuration are missing in A.10.2.2 and A.11.3.2 2. The SSB configuration is missing in A.10.2.2 and A.11.3.2 3. The SMTC configuration is missing in A.10.2.2 and A.11.3.2 4. The DL and UL CCA probabilty are TBD 5. The note about UE is only required to be tested in one supported configuration in A.11.3.2 is misleading as there is only one configuration. 6. Applicability rules for TA test cases for EN-DC only supporting NR-U band and SA only supporting NR-U band should be added. 7. Typos need to be fixed.   R4-2114440 Correction to BWP switching tests for NR-U in 38.133  To correct parameters in the test cases verifying the BWP switching requirements for carrier subject to CCA.  R4-2114118 CR on TC of BWP switch requirements for NR-U R17   1. The note about UE is only required to be tested in one supported configuration in A.11.4.5.1/2/3 is misleading as there is only one configuration. 2. The CORESET RMC with 24 RBs will caused test issue in RAN5 with DLBWP.0.2 as elaborated in R4-2110764.   R4-2114173 DraftCR (R17) Correction of test cases for SCell (de)activation  Values for probability of CCA on DL and UL for semi-static and dynamic channel access, respectively, were finalized at RAN4#99e (see WF R4-2108260). In some of the test cases that were agreed at RAN4#99e the values for probability of CCA are either correct and within brackets, incorrect, or missing. Hence those test cases need to be updated to reflect the agreement in WF R4-2108260.  R4-2114104 CR on TC of cell reselection for NR-U R17  For TC with DLBWP.0.2 and CCR.1.1 with 24 RBs, it is identified that there is issue to fully contain the RMC CORESET within the DL BWP as elaborated in R4-2110764. Thus, it is suggested to add a new RMC CORESET with 18 RBs as configuration of CCR.2.3 in licensed operation.  R4-2114120 CR on TC of PSCell addition and release for NR-U R17   1. In the current TC for PSCell addition, it is required that UE shall report Event A4 during T2. However, for EN-DC with PScell on carrier with CCA, UE shall report Event B1 to make sure the target PSCell is known. 2. Typos need to be fixed.   R4-2114171 DraftCR (R17) Correction of test cases for interruptions  Values for probability of CCA on DL and UL for semi-static and dynamic channel access, respectively, were finalized at RAN4#99e (see WF R4-2108260). In some of the test cases that were agreed at RAN4#99e the values for probability of CCA are either correct and within brackets, incorrect, or missing. Hence those test cases need to be updated to reflect the agreement in WF R4-2108260. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The summary of change in each endorsed draft CR is copied below.  R4-2113465 Draft CR: Correction of RMC for NR-U test cases  Decrease SNR levels by 3dB for T3 and 3.5dB for T4 for RLM with 4Rx as same as Rel-15 test cases.  Decrease SNR levels by 3dB for T3/T4/T5 for BFD with 4Rx UEs as same as Rel-15 test cases.  R4-2114106 CR on TC of cell reselection for NR-U R17   1. Change Qrxlevmin to -127 in A.11.1.1 2. Provide configurations of SintrasearchP and SnonintrasearchP 3. Provide STMC configurations 4. Add the note that UE is only required to be tested in one configurations when multiple configurations are provided 5. Correct the Io value 6. Define Es/Iot in A.11.1.3.1.2-3. 7. Fix some typos   R4-2114108 CR on TC of HO for NR-U R17   1. Add dedicated CORESET RMC configuration in A.11.2.1.1 to A.11.2.1.8 2. Add RMSI CORESET RMC configuration in A.11.2.1.6 to A.11.2.1.8 3. Correct DL CCA probability and UL CCA probability in A.11.2.1.4 to A.11.2.1.8 4. Add CCA model in A.11.2.1.5 5. Add PRACH configuration 6. Add CCA probability, PRACH configuration in A.12.2.1.1 7. Correct Noc configuration in A.12.2.1.1. 8. Add note that the UE is only required to be tested in one of the supported test configurations 9. Add note in A.11.2.1.7 and A.11.2.1.8 about the applicability rule 10. Typos fixed   R4-2113231 Draft CR Correction of Handover TCs  Definition of CCA parameters according to agreements in the last meeting.  Corection of the interuption time. Clarification of the need for only one out of the two possible configurations needing to be tested.  R4-2114434 Correction to RRC re-establishment tests for NR-U in 38.133  The following corrections are done:   * PRACH configuration is defined or corrected. The correct one is FR1 PRACH configuration 1 under CCA used for SSB-based contention based random access in FR1 is used. It is defined in Table A.3.8A.2.1-1. * Brackets are removed from test times and signal levels and some configuration parameters. * Io, No and Es/No values are corrected. * Testing requirement is corrected.   R4-2113233 Draft CR RRC Re-establishment with CCA  Update testing time in accordance to agreement in the previous meeting.  Definition of re-establishment delay  Correction of test parameters in accordance to CCA configurations.  R4-2114436 Correction to RRC re-direction tests for NR-U in 38.133  The following corrections are done:   * Following missing CCA failure probabilies are defined in one test:   + PCCA\_DL for dynamic channel access and PCCA\_DL for semi-static channel access   + PCCA\_UL for dynamic channel access and PCCA\_UL for semi-static channel access * FR1 PRACH configuration 1 in Table A.3.8A.2.1-1 is stated. * Brackets are removed from some configuration parameters. * Missing notes related to dynamic channel access and semi-static channel access are added. * Test requirement is corrected.   R4-2114112 CR on TC of RRC Release with Redirection for NR-U R17   1. Add DL and UL CCA probability configurations in A.11.2.2.3.2 2. Add Dedicated CORESET RMC in A.11.2.2.3.1/2 3. Typos are fixed   R4-2113469 Draft CR: Correction of random access procedure test cases for NR-U  Removal of square brackets  Correction for CCA models.  R4-2114116 CR on TC of timing requirements for NR-U R17   1. Add TDD configuration, PDSCH RMC, CORSET RMC, TRS configuration in A.10.2.2 and A.11.3.2 2. Add SSB configuration is missing in A.10.2.2 and A.11.3.2 3. Add SMTC configuration is missing in A.10.2.2 and A.11.3.2 4. Add DL and UL CCA probabilty 5. Remove the note bout UE is only required to be tested in one supported configuration in A.11.3.2 6. Add the applicability rules for TA test cases. 7. Typos are fixed   R4-2114440 Correction to BWP switching tests for NR-U in 38.133  The following corrections are done:   * Following missing CCA failure probabilies are defined in the tests:   + PCCA\_DL for dynamic channel access and PCCA\_DL for semi-static channel access   + PCCA\_UL for dynamic channel access and PCCA\_UL for semi-static channel access * Brackets are removed from some configuration parameters. * Missing notes related to dynamic channel access and semi-static channel access are added. * Redundant text is removed.   R4-2114118 CR on TC of BWP switch requirements for NR-U R17   1. Remove the note bout UE is only required to be tested in one supported configuration in A.11.4.5.1/2/3 2. Change the CORESET RMC from CCR.1.1 CCA to CCR.1.3 CCA   R4-2114173 DraftCR (R17) Correction of test cases for SCell (de)activation  The following corrections are made:   * A.10.3.3.1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 160 ms SCell measurement cycle   + Removed brackets   + Introduced separat rows for semi-static and dynamic channel access, respectively, on UL   + Updated P\_CCA value for semi-static channel access on DL   + Updated P\_CCA value for semi-static channel access on UL   + Tcsi\_Reporting is modified considering the time for acquiring the first available DL CSI RS, UE processing time and uncertainty in acquiring the first CSI reporting resource in A.10.3.3.1 A.11.4.3.1 A.13.2.2.1, which is aligned with the configuration in existing TC for SCell activation for licensed operation.   + PDCH RMC, CORESET RMC, RMSI RMC for cell 3 in A.10.3.3.1 and cell 2 in A.11.4.3.1 and Cell 2 in A.13.2.2.1 are added.   + The dedicated CORESET configurations for Cell 2 in A.10.3.3.1 and cell 1 in A.11.4.3.1 and Cell 1 in A.13.2.2.1 are defined as CCR.1.3   + Io configuration in A.10.3.3.1 A.11.4.3.1 A.13.2.2.1 are added.   + CSI reporting periodicity is changed to very 4 slots.   + Introducing configuration of LCCA\_DL * A.11.4.3.1 SCell Activation and Deactivation of known SCell with PCell and SCell under CCA, 160 ms SCell measurement cycle   + Removed brackets   + Introduced separat rows for semi-static and dynamic channel access, respectively, on UL   + Updated P\_CCA value for semi-static channel access on DL   + Updated P\_CCA value for semi-static channel access on UL   + Tcsi\_Reporting is modified considering the time for acquiring the first available DL CSI RS, UE processing time and uncertainty in acquiring the first CSI reporting resource in A.10.3.3.1 A.11.4.3.1 A.13.2.2.1, which is aligned with the configuration in existing TC for SCell activation for licensed operation.   + PDCH RMC, CORESET RMC, RMSI RMC for cell 3 in A.10.3.3.1 and cell 2 in A.11.4.3.1 and Cell 2 in A.13.2.2.1 are added.   + The dedicated CORESET configurations for Cell 2 in A.10.3.3.1 and cell 1 in A.11.4.3.1 and Cell 1 in A.13.2.2.1 are defined as CCR.1.3   + Io configuration in A.10.3.3.1 A.11.4.3.1 A.13.2.2.1 are added.   + CSI reporting periodicity is changed to very 4 slots.   + Introducing configuration of LCCA\_DL * A.13.2.2.1 SCell Activation and Deactivation of known SCell under CCA, 160 ms SCell measurement cycle   + Removed brackets   + Updated P\_CCA value for semi-static channel access on DL   + Tcsi\_Reporting is modified considering the time for acquiring the first available DL CSI RS, UE processing time and uncertainty in acquiring the first CSI reporting resource in A.10.3.3.1 A.11.4.3.1 A.13.2.2.1, which is aligned with the configuration in existing TC for SCell activation for licensed operation.   + PDCH RMC, CORESET RMC, RMSI RMC for cell 3 in A.10.3.3.1 and cell 2 in A.11.4.3.1 and Cell 2 in A.13.2.2.1 are added.   + The dedicated CORESET configurations for Cell 2 in A.10.3.3.1 and cell 1 in A.11.4.3.1 and Cell 1 in A.13.2.2.1 are defined as CCR.1.3   + Io configuration in A.10.3.3.1 A.11.4.3.1 A.13.2.2.1 are added.   + CSI reporting periodicity is changed to very 4 slots.   + Introducing configuration of LCCA\_DL   + Removal of dependency of L4, after update introduced by CR1890   R4-2114104 CR on TC of cell reselection for NR-U R17  Add new RMC CORESET CCR.1.3 CCA.  R4-2114120 CR on TC of PSCell addition and release for NR-U R17   1. Change Event A4 to Event B1 2. Typos are fixed.   R4-2114171 DraftCR (R17) Correction of test cases for interruptions  The following corrections are made:   * A.10.3.2.1 E-UTRAN – NR interruptions during SCell operations with CCA   + Removed brackets   + Introduced separat rows for semi-static and dynamic channel access, respectively, on UL   + Updated P\_CCA value for semi-static channel access on DL   + Updated P\_CCA value for semi-static channel access on UL * A.11.4.2.1 NR interruptions during Scell operations with CCA on PCell and SCell   + Removed brackets   + Introduced separat rows for semi-static and dynamic channel access, respectively, on UL   + Updated P\_CCA value for semi-static channel access on DL   + Updated P\_CCA value for semi-static channel access on UL * A.13.2.1.1 NR interruptions during SCell operations with CCA on SCell   + Removed brackets   + Updated P\_CCA value for semi-static channel access on DL | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are coppied below.  R4-2113465 Draft CR: Correction of RMC for NR-U test cases  TE cannot set SNR test points for NR-U RLM/BFD tests for NR-U.  R4-2114106 CR on TC of cell reselection for NR-U R17  The test cases are wrong  R4-2114108 CR on TC of HO for NR-U R17  The test cases are wrong  R4-2113231 Draft CR Correction of Handover TCs  Incomplete configuration for Handover test case with CCA.  R4-2114434 Correction to RRC re-establishment tests for NR-U in 38.133  The RRC re-establishment in NR-U cannot be tested or tests will be done with incorrect parameters.  R4-2113233 Draft CR RRC Re-establishment with CCA  Incorrect test cases for RRB re-establishment.  R4-2114436 Correction to RRC re-direction tests for NR-U in 38.133  The RRC re-rediection in NR-U cannot be tested or tests will be done with incorrect parameters.  R4-2114112 CR on TC of RRC Release with Redirection for NR-U R17  The test cases are wrong  R4-2113469 Draft CR: Correction of random access procedure test cases for NR-U  NR-U random access test cases are not complete.  R4-2114116 CR on TC of timing requirements for NR-U R17  The test cases are wrong  R4-2114440 Correction to BWP switching tests for NR-U in 38.133  The BWP switching requirements in NR-U cannot be tested or tests will be done with incorrect parameters.  R4-2114118 CR on TC of BWP switch requirements for NR-U R17  The test cases are wrong  R4-2114173 DraftCR (R17) Correction of test cases for SCell (de)activation  Test cases will be incorrect and incomplete.  R4-2114104 CR on TC of cell reselection for NR-U R17  The test cases are wrong  R4-2114120 CR on TC of PSCell addition and release for NR-U R17  The test cases are wrong  R4-2114171 DraftCR (R17) Correction of test cases for interruptions  Test cases will be incomplete and incorrect. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | The clauses affected for each endorsed draft CR are coppied below.  R4-2113465 Draft CR: Correction of RMC for NR-U test cases  A.3.6A  R4-2114106 CR on TC of cell reselection for NR-U R17  A.11.1.1, A.11.1.2, A.11.1.3, A.11.1.4  R4-2114108 CR on TC of HO for NR-U R17  A.11.2.1.1 to A.11.2.1.8  R4-2113231 Draft CR Correction of Handover TCs  A.12.2.1  R4-2114434 Correction to RRC re-establishment tests for NR-U in 38.133  A.11.2.2.1.3.1 and A.11.2.2.1.4.1.  R4-2113233 Draft CR RRC Re-establishment with CCA  A.11.2.2.1.1  R4-2114436 Correction to RRC re-direction tests for NR-U in 38.133  A.11.2.2.3.2.2.  R4-2114112 CR on TC of RRC Release with Redirection for NR-U R17  A.11.2.2.3.1  R4-2113469 Draft CR: Correction of random access procedure test cases for NR-U  A.10.1.1.1, A.11.2.2.2  R4-2114116 CR on TC of timing requirements for NR-U R17  A.10.2 and A.11.3  R4-2114440 Correction to BWP switching tests for NR-U in 38.133  A.10.3.5.2.1.1, A.10.3.5.2.2.1, A.10.3.5.3.1.1  R4-2114118 CR on TC of BWP switch requirements for NR-U R17  A.11.4.5  R4-2114173 DraftCR (R17) Correction of test cases for SCell (de)activation  A.10.3.3, A.11.4.3, A.13.2.2  R4-2114104 CR on TC of cell reselection for NR-U R17  A.3.1A.3  R4-2114120 CR on TC of PSCell addition and release for NR-U R17  A.10.3.6  R4-2114171 DraftCR (R17) Correction of test cases for interruptions  A.10.3.2, A.11.4.2, A.13.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 Change 1 (R4-2113465)>

## A.3.6A Antenna configurations with unlicensed bands

### A.3.6A.1 Antenna configurations for FR1

Unless otherwise specified, NR unlicensed cells in all RRM Test cases in AWGN propagation condition are configured with Antenna Configuration 1x2.

#### A.3.6A.1.1 Antenna connection for 4 Rx capable UEs

##### A.3.6A.1.1.1 Introduction

All tests in clause A.13, A.10, A.11, and A.12 are specified for UEs supporting 2RX. In this clause, the antenna connection method for applying 2RX tests to UEs supporting 4RX antenna ports is specified. No tests are currently specified in clause A.13, A.10, A.11 or A.12 which are applicable only to 4RX antenna ports, so 4RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs.

##### A.3.6A.1.1.2 Principle of testing

A.3.6A.1.1.2.1 Single carrier tests

For 4RX capable UEs supporting at least one 2RX band, the, all single carrier tests specified in clause A.13. A.10, A.11 and A.12 except those in A.13.4, A.10.5, A.11.6 and A.12.5 shall be tested on any band where 2RX is supported with the antenna connection specified in A.3.6A.1.1.2.4. For single carrier tests specified in clause A.13.4, A.10.5, A.11.6 or A.12.5, all tests shall be tested with the antenna connection specified in A.3.6A.1.1.2.4 for bands where 2RX is supported, and the antenna connection specified in A.3.6A.1.1.2.5 for bands where 4RX is supported.

For 4RX capable UEs which do not support any 2RX band, all tests specified in clauses A.13, A.10, A.11 and A.12 shall be tested using the antenna connection specified in clause A.3.6A.1.1.2.5. For radio link monitoring tests, the SNR levels are modified according to table A.3.6A.1.1.2.1-1 and table A.3.6A.1.1.2.1-2

Table A.3.6A.1.1.2.1-1: Modified parameters for RLM out of sync testing with 4 RX antenna connection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test case | SNR during T3 (dB) | | | |
|  | Test 1 | Test 2 | Test 3 | Test 4 |
| A.10.3.1.2 | -18 | N/A | N/A | N/A |
| A.10.3.1.4 | TBD | N/A | N/A | N/A |
| A.11.4.1.2 | -18 | N/A | N/A | N/A |
| A.11.4.1.4 | TBD | N/A | N/A | N/A |

Table A.3.6A.1.1.2.1-2: Modified parameters for RLM in sync single carrier testing with 4 RX antenna connection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test case | SNR during T3 (dB) | | SNR during T4 (dB) | |
|  | Test 1 | Test 2 | Test 1 | Test 2 |
| A.10.3.1.3 | -18 | N/A | -8 | N/A |
| A.10.3.1.5 | TBD | N/A | TBD | N/A |
| A.11.4.1.3 | -18 | N/A | -8 | N/A |
| A.11.4.1.5 | TBD | N/A | TBD | N/A |

Table A.3.6A.1.1.2.1-3: Modified parameters for Beam Failure Detection and Link Recovery testing with 4 RX antenna connection

|  |  |  |
| --- | --- | --- |
| Test case | SNR for RS in set q0 during T3, T4 and T5 (dB) | |
|  | Test 1 | Test 2 |
| A.10.3.4.1 | -15 | N/A |
| A.10.3.4.2 | -15 | N/A |
| A.11.4.4.1 | -15 | N/A |
| A.11.4.4.2 | -15 | N/A |

A.3.6A.1.1.2.2 Carrier aggregation tests

All carrier aggregation tests are performed using the antenna connection in clause A.3.6A.1.1.2.4 for the PCell antenna connection if the PCell is on a band where 2RX is supported or the antenna connection in A.3.6A.1.1.2.5 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All carrier aggregation tests are performed using the antenna connection in clause A.3.6A.1.1.2.4 for the SCell antenna connection if an SCell is on band where 2RX is supported or the testing procedure in A.3.6A.1.1.2.5 for the SCell antenna connection if an SCell is on a band where 4RX is supported.

A.3.6A.1.1.2.3 EN-DC tests

All carrier aggregation tests are performed using the antenna connection in clause A.3.6A.1.1.2.6 for the PCell antenna connection if the PCell is on a band where 2RX is supported or the antenna connection in A.3.6A.1.1.2.7 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All carrier aggregation tests are performed using the antenna connection in clause A.3.6A.1.1.2.4 for the PSCell or SCell antenna connection if an SCell is on band where 2RX is supported or the testing procedure in A.3.6A.1.1.2.5 for the SCell antenna connection if an SCell or PSCell is on a band where 4RX is supported.

A.3.6A.1.1.2.4 Antenna connection for bands where 2RX is supported

For bands where 2RX is supported, it is left to the UE declaration and AP configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaining 2 Rx ports shall be connected with zero input**.** No test parameters or requirements are modified.

A.3.6A.1.1.2.5 Antenna connection for bands where 4RX is supported

For bands where 4RX is supported, all 4 RX antennas are connected with data source from system simulator**.** The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses A.3.6A.1.1.2.1 and A.3.6A.1.1.2.2, no test parameters or requirements are modified.

A.3.6A.1.1.2.6 EN-DC LTE Antenna connection for bands where 2RX is supported

For bands where LTE 2RX is supported, it is left to the UE declaration and AP configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaining 2 Rx ports shall be connected with zero input**.** No test parameters or requirements are modified.

A.3.6A.1.1.2.7 EN-DC LTE Antenna connection for bands where 4RX is supported

For bands where LTE 4RX is supported, all 4 RX antennas are connected with data source from system simulator**.** The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses A.3.8.1.2.1 and A.3.8.1.2.2 of TS 36.133 [15], no test parameters or requirements are modified.

### <End of Change 1>

### <Start of Change 2 (R4-2114106)>

## A.11.1 RRC\_IDLE state mobility

### A.11.1.1 Cell re-selection with both source and target NR carrier frequencies under CCA

#### A.11.1.1.1 Cell reselection to FR1 intra-frequency NR cells when subject to CCA on the serving and target cell

##### A.11.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements subject to CCA specified in clause 4.2A.2.3. Supported test configurations are shown in table A. 11.1.1.1.2-1.

##### A.11.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier that is subject to CCA and 2 cells as given in tables A.11.1.1.1.2-1, A.11.1.1.1.2-2 and A.11.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.11.1.1.1.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case when subject to CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial | Active cell |  | 1 | Cell1 |  |
| condition | Neighbour cells |  | 1 | Cell2 |  |
| T2 end condition | Active cell |  | 1 | Cell2 |  |
| Neighbour cells |  | 1 | Cell1 |  |
| Final condition | Active cell |  | 1 | Cell1 |  |
| RF Channel Number | |  | 1 | 1 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | Semi-static channel access |  | 1 | SSB.1 CCA | (As defined in A.3.10A ) |
| Dynamic channel access | SSB.2 CCA |
| DBT Window Configuration | |  | 1 | DBT.1 | As specified in clause A.3.28.1. |
| SMTC confituration | |  |  | SMTC.1 |  |
| DL CCA model | |  | 1 | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | 1 | As specified in clause A.3.26.2.2 |  |
| DRX cycle length | | s | 1 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1 | Not configured |  |
| T1 | | s | 1 | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 1 | 40 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1 | 15 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.11.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN when subject to CCA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1 | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | | |
| DL CCA probability for semi-static channel access (PCCA\_DL) |  | 1 | 0.9 | | | 0.9 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_1) |  | 1 | 0.75 | | | 0.75 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_2) |  | 1 | 0.5 | | | 0.5 | | |
| UL CCA probability PCCA\_UL |  | 1 | 1 | | | 1 | | |
| Md,max |  | 1 | 16 | | | 16 | | |
| Mm,max |  | 1 | 4 | | | 4 | | |
| Me,max |  | 1 | 8 | | | 8 | | |
| PDSCH RMC |  | 1 | SR.1.1 CCA | | | SR.1.1 CCA | | |
| RMSI CORESET |  | 1 | CR.1.1 CCA | | | CR.1.1 CCA | | |
| Dedicated CORESET |  | 1 | CCR.1.1 CCA | | | CCR.1.1 CCA | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -127 | | | -127 | | |
| Pcompensation | dB | 1 | 0 | | | 0 | | |
| Qhysts | dB | 1 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1 | SS-RSRP | | | SS-RSRP | | |
|  | dB | 1 | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | |
|  | dB | 1 | 16 | 13 | 16 | -infinity | 16 | 13 |
|  |
| SS-RSRP Note3 | dBm/SCS | 1 | -79 | -82 | -79 | -infinity | -79 | -82 |
|  |  |
|  |  |
| Io | dBm/38.16 MHz | 1 | -47.85 | -46.12 | -46.12 | Same as parameters specified in Cell 1 columns- | | |
| Treselection | s | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1 | 50 | | | 50 | | |
| Propagation Condition |  | 1 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | |

##### A.11.1.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than (25 + Md)\*1.28 + TSI\_CCA s. Md is the number of DRX cycles with at least one SMTC where there are no SSBs available during the Tdetect,NR\_Intra\_CCA. If Md > Md,max the UE is required to restart the detection of Cell 2.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than (5+Me)\*1.28 + TSI\_CCA s. Me is the number of DRX cycles with at least one SMTC where there are no SSBs available during the Tevaluate,NR\_Intra\_CCA. If Me > Me,max the UE is required to restart the evaluation of Cell 2.

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

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect, NR\_Intra\_CCA + TSI\_CCA, and to an already detected cell can be expressed as: Tevaluate, NR\_ intra\_CCA + TSI\_CCA,

Where:

Tdetect, NR\_Intra\_CCA See Table 4.2A.2.3-1 in clause 4.2A.2.3

Tevaluate, NR\_ intra\_CCA See Table 4.2A.2.3-1 in clause 4.2A.2.3

TSI\_CCA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.

This gives a total of (25 + Md)\*1.28 + TSI\_CCA s for the cell re-selection delay to a newly detectable cell and (5+Me)\*1.28 + TSI\_CCA s for the cell re-selection delay to an already detected cell in the test case.

#### A.11.1.1.2 Cell reselection to FR1 inter-frequency NR case when subject to CCA on the serving and target cell

##### A.11.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements subject to CCA specified in clause 4.2A.2.4. Supported test configurations are shown in table A.11.1.1.2.2-1.

##### A.11.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers that are subject to CCA respectively as given in tables A.11.1.1.2.2-1, A.11.1.1.2.2-2 and A.11.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.11.1.1.2.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of cell 1 with CCA | Description of cell 2 with CCA |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.1.1.2.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case when subject to CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1 | Cell2 | The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1 |
| T1 end condition | Active cell |  | 1 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
| Neighbour cells |  | 1 | Cell2 |
| T3 end condition | Active cell |  | 1 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
| RF Channel Number | |  | 1 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | Semi-static channel access |  | 1 | SSB.1 CCA  (As defined in A.3.10A ) |  |
| Dynamic channel access | SSB.2 CCA  (As defined in A.3.10A ) |
| DBT Window Configuration | |  | 1 | DBT.1 | As specified in clause A.3.28.1. |
| SMTC configuration | |  | 1 | SMTC.1 |  |
| DL CCA model | |  | 1 | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | 1 | As specified in clause A.3.26.2.2 |  |
| DRX cycle length | | s | 1 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1 | Not configured |  |
| T1 | | s | 1 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1 | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1 | 75 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.11.1.1.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1 | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | | |
| DL CCA probability for semi-static channel access (PCCA\_DL) |  | 1 | 0.9 | | | 0.9 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_1) |  | 1 | 0.75 | | | 0.75 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_2) |  | 2 | 0.5 | | | 0.5 | | |
| UL CCA probability PCCA\_UL |  | 1 | 1 | | | 1 | | |
| Md,max |  | 1 | 16 | | | 16 | | |
| Mm,max |  | 1 | 4 | | | 4 | | |
| Me,max |  | 1 | 8 | | | 8 | | |
| PDSCH RMC |  | 1 | SR.1.1 CCA | | | SR.1.1 CCA | | |
| RMSI CORESET |  | 1 | CR.1.1 CCA | | | CR.1.1 CCA | | |
| Dedicated CORESET |  | 1 | CCR.1.1 CCA | | | CCR.1.1 CCA | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -137 | | | -137 | | |
|  |  |
| Pcompensation | dB | 1 | 0 | | | 0 | | |
| Qhysts | dB | 1 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1 | SS-RSRP | | | SS-RSRP | | |
|  | dB | 1 | 14 | 14 | 14 | -4 | -infinity | 12 |
| Note2 | dBm/SCS | 1 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | |
|  | dB | 1 | 14 | 14 | 14 | -4 | -infinity | 12 |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -81 | -81 | -81 | -99 | -infinity | -83 |
|  |  |
|  |  |
| Io | dBm/38.16 MHz | 1 | -49.79 | -49.79 | -49.79 | -62.50 | -infinity | -51.69 |
|  |
|  |
| Treselection | s | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1 | 50 | | | 50 | | |
| Threshx, high | dB | 1 | 48 | | | 48 | | |
| Threshserving, low | dB | 1 | 44 | | | 44 | | |
| Threshx, low | dB | 1 | 50 | | | 50 | | |
| Propagation Condition |  | 1 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | |

##### A.11.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 60 + 1.28 x (5 + Me) + TSI\_CCA s. Me is the number of DRX cycles with at least one SMTC where there are no SSBs available during the Tevaluate,NR\_Intra\_CCA. If Me > Me,max the UE is required to restart the evaluation of cell 2.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 1.28 x (5 + Me) + TSI\_CCA s. Me is the number of DRX cycles with at least one SMTC where there are no SSBs available during the Tevaluate,NR\_Intra\_CCA. If Me > Me,max the UE is required to restart the evaluation of cell 2.

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

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate, NR\_ inter\_CCA + TSI\_CCA, and to a lower priority cell can be expressed as: Tevaluate, NR\_ inter\_CCA + TSI\_CCA,

Where:

Thigher\_priority\_search See clause 4.2.2.7

Tevaluate, NR\_ inter\_CCA See Table 4.2A.2.4-1 in clause 4.2A.2.4

TSI\_CCA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.

This gives a total of 60 + 1.28 x (5 + Me) + TSI\_CCA s for the cell re-selection delay to a higher priority cell and 1.28 x (5 + Me) + TSI\_CCA s for the cell re-selection delay to a lower priority cell in the test case.

### A.11.1.2 Cell re-selection to NR with source NR carrier frequency under CCA

#### A.11.1.2.1 Cell reselection to FR1 inter-frequency NR case when serving cell is subject to CCA

##### A.11.1.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4 when the serving cell is subject to CCA. Supported test configurations are shown in table A.11.1.2.1.2-1.

##### A.11.1.2.1.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers where the first carrier is subject to CCA as given in tables A.11.1.2.1.2-1, A.11.1.2.1.2-2 and A.11.1.2.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.11.1.2.1.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 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.11.1.2.1.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case when serving cell is subject to CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell2 | The UE camps on cell 2 which is subject to CCA in the initial phase and during T1 period the UE reselects to cell 1 which is an inter-frequency NR cell |
| T1 end condition | Active cell |  | 1, 2, 3 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
| Neighbour cells |  | 1, 2, 3 | Cell2 |
| T3 end condition | Active cell |  | 1, 2, 3 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
| RF Channel Number | |  | 1, 2, 3 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | Cell 1: SSB.1 FR1  Cell 2: SSB.1 CCA for semi-static channel access;  Cell 2: SSB.2 CCA for dynamic channel access |  |
|  | |  | 2 | Cell 1: SSB.1 FR1  Cell 2: SSB.1 CCA for semi-static channel access;  Cell 2: SSB.2 CCA for dynamic channel access |  |
|  | |  | 3 | Cell 1: SSB.2 FR1  Cell 2: SSB.1 CCA for semi-static channel access;  Cell 2: SSB.2 CCA for dynamic channel access |  |
| SMTCconfiguration | |  | 1 | Cell 1: SMTC pattern 2  Cell 2: N/A |  |
|  | |  | 2 | Cell 1: SMTC pattern 1  Cell 2: N/A |  |
|  | |  | 3 | Cell 1: SMTC pattern 1  Cell 2: N/A |  |
| DBT Window Configuration | |  | 1, 2, 3 | Cell 1: N/A  Cell 2: DBT.1 | As specified in clause A.3.28.1. |
| DL CCA model | |  | 1, 2, 3 | Cell 1: N/A  Cell 2: As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | 1, 2, 3 | Cell 1: N/A  Cell 2: As specified in clause A.3.26.2.2 |  |
| DRX cycle length | | s | 1, 2, 3 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3 | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2, 3 | 75 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.11.1.2.1.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN when serving cell is subject to CCA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | | Cell 2 | | |
| T1 | T2 | T3 | | T1 | T2 | T3 |
| TDD configuration |  | 1 | N/A | | | | TDDConf.1.1.CCA | | |
|  |  | 2 | TDDConf.1.1 | | | | TDDConf.1.1.CCA | | |
|  |  | 3 | TDDConf.2.1 | | | | TDDConf.1.1.CCA | | |
| DL CCA probability for semi-static channel access (PCCA\_DL) |  | 1, 2, 3 | N/A | | | | 0.9 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_1) |  | 1, 2, 3 | N/A | | | | 0.75 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_2) |  | 1, 2, 3 | N/A | | | | 0.5 | | |
| UL CCA probability PCCA\_UL |  | 1, 2, 3 | N/A | | | | 1 | | |
| Md,max |  | 1, 2, 3 | N/A | | | | 16 | | |
| Mm,max |  | 1, 2, 3 | N/A | | | | 4 | | |
| Me,max |  | 1, 2, 3 | N/A | | | | 8 | | |
| PDSCH RMC |  | 1 | SR.1.1 FDD | | | | SR.1.1 CCA | | |
| configuration |  | 2 | SR.1.1 TDD | | | | SR.1.1 CCA | | |
|  |  | 3 | SR.2.1 TDD | | | | SR.1.1 CCA | | |
| RMSI CORESET |  | 1 | CR.1.1 FDD | | | | CR.1.1 CCA | | |
| RMC configuration |  | 2 | CR.1.1 TDD | | | | CR.1.1 CCA | | |
|  |  | 3 | CR.2.1 TDD | | | | CR.1.1 CCA | | |
| Dedicated CORESET |  | 1 | CCR.1.1 FDD | | | | CCR.1.1 CCA | | |
| RMC configuration |  | 2 | CCR.1.1 TDD | | | | CCR.1.1 CCA | | |
|  |  | 3 | CCR.2.1 TDD | | | | CCR.1.1 CCA | | |
| OCNG Pattern |  | 1, 2, 3 | OP.1 defined in A.3.2.1 | | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3 | SSB | | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2 | -140 | | | | -137 | | |
|  |  | 3 | -137 | | | | -137 | | |
| Pcompensation | dB | 1, 2, 3 | 0 | | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | | | SS-RSRP | | |
|  | dB | 1 | 14 | 14 | 14 | | -4 | -infinity | 12 |
|  |  | 2 |  |  |  | |  |  |  |
|  |  | 3 |  |  |  | |  |  |  |
| Note2 | dBm/SCS | 1 | -98 | | | -95 | | | |
|  |  | 2 | -98 | | | -95 | | | |
|  |  | 3 | -95 | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | |
|  |  | 2 |  | | | | | | |
|  |  | 3 |  | | | | | | |
|  | dB | 1 | 14 | 14 | 14 | | -4 | -infinity | 12 |
|  |  | 2 |  |  |  | |  |  |  |
|  |  | 3 |  |  |  | |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -84 | -84 | -84 | | -102 | -infinity | -83 |
|  |  | 2 | -84 | -84 | -84 | | -102 | -infinity | -83 |
|  |  | 3 | -81 | -81 | -81 | | -99 | -infinity | -83 |
| Io | dBm/9.36 MHz | 1 | -55.88 | -55.88 | -55.88 | | -68.60 | -- | -- |
|  | dBm/9.36 MHz | 2 | -55.88 | -55.88 | -55.88 | | -68.60 | -- | -- |
|  | dBm/38.16 MHz | 3 | -49.79 | -49.79 | -49.79 | | -62.50 | -63.96 | -51.69 |
| Treselection | s | 1, 2, 3 | 0 | 0 | 0 | | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2, 3 | 50 | | | | 50 | | |
| Threshx, highP | dB | 1, 2, 3 | 48 | | | | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3 | 44 | | | | 44 | | |
| Threshx, lowP | dB | 1, 2, 3 | 50 | | | | 50 | | |
| Propagation Condition |  | 1, 2, 3 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | |

##### A.11.1.2.1.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 60 + 1.28 x (5 + Me) + TSI\_CCA s. Me is the number of DRX cycles with at least one SMTC where there are no SSBs available during the Tevaluate,NR\_Intra\_CCA. If Me > Me,max the UE is required to restart the evaluation of cell 2.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

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

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate, NR\_ inter\_CCA + TSI\_CCA, and to a lower priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR.

Where:

Thigher\_priority\_search See clause 4.2.2.7

Tevaluate, NR\_ inter\_CCA See Table 4.2A.2.4-1 in clause 4.2A.2.4

TSI\_CCA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.

Tevaluate, NR\_ inter See Table 4.2.2.4-1 in clause 4.2.2.4

TSI-NR Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test cases.

This gives a total of 60 + 1.28 x (5 + Me) + TSI\_CCA s for the cell re-selection delay to a higher priority cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

### A.11.1.3 Cell re-selection from NR carrier with target NR carrier frequency under CCA

#### A.11.1.3.1 Cell reselection to FR1 inter-frequency NR case when target cell is subject to CCA

##### A.11.1.3.1.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause  4.2A.2.4 when the target cell is subject to CCA. Supported test configurations are shown in table A. 11.1.3.1.2-1.

##### A.11.1.3.1.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers where the second carrier is subject to CCA as given in tables A.11.1.3.1.2-1, A.11.1.3.1.2-2 and A.11.1.3.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.11.1.3.1.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell without CCA | Description of a cell with CCA |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| The UE is only required to be tested in one of the supported test configurations. | | |

Table A.11.1.3.1.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case when target cell is subject to CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell2 | The UE camps on cell 2 which is an inter-frequency NR cell in the initial phase and during T1 period the UE reselects to cell 1 which is cell subject to CCA |
|  | Neighbour cell |  | 1, 2, 3 | Cell 1 |  |
| T1 end condition | Active cell |  | 1, 2, 3 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
|  | Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2, 3 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
|  | Neighbour cell |  | 1, 2, 3 | Cell 1 |  |
| RF Channel Number | |  | 1, 2, 3 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | Cell 1: SSB.1 CCA for semi-static channel access;  Cell 1: SSB.2 CCA for dynamic channel access;  Cell 2: SSB.1 FR1 |  |
|  | |  | 2 | Cell 1: SSB.1 CCA for semi-static channel access;  Cell 1: SSB.2 CCA for dynamic channel access;  Cell 2: SSB.1 FR1 |  |
|  | |  | 3 | Cell 1: SSB.1 CCA for semi-static channel access;  Cell 1: SSB.2 CCA for dynamic channel access; Cell 2: SSB.2 FR1 |  |
| SMTCconfiguration | |  | 1 | Cell 1: SMTC.1  Cell 2: SMTC.2 |  |
|  | |  | 2 | Cell 1: SMTC.1  Cell 2: SMTC.1 |  |
|  | |  | 3 | Cell 1: SMTC.1  Cell 2: SMTC.1 |  |
| DBT Window Configuration | |  | 1, 2, 3 | Cell 1: DBT.1  Cell 2: N/A | As specified in clause A.3.28.1. |
| DL CCA model | |  | 1, 2, 3 | Cell 1: As specified in clause A.3.26.2.1  Cell 2: N/A |  |
| UL CCA model | |  | 1, 2, 3 | Cell 1: As specified in clause A.3.26.2.2  Cell 2: N/A |  |
| DRX cycle length | | s | 1, 2, 3 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3 | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2, 3 | 75 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.11.1.3.1.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN when target cell is subject to CCA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | | Cell 2 | | |
| T1 | T2 | T3 | | T1 | T2 | T3 |
| TDD configuration |  | 1 | TDDConf.1.1.CCA | | | | N/A | | |
|  |  | 2 | TDDConf.1.1.CCA | | | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.1.1.CCA | | | | TDDConf.2.1 | | |
| DL CCA probability for semi-static channel access (PCCA\_DL) |  | 1, 2, 3 | 0.9 | | | | N/A | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_1) |  | 1, 2, 3 | 0.75 | | | | N/A | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_2) |  | 1, 2, 3 | 0.5 | | | | N/A | | |
| UL CCA probability PCCA\_UL |  | 1, 2, 3 | 1 | | | | N/A | | |
| Md,max |  | 1, 2, 3 | 16 | | | | N/A | | |
| Mm,max |  | 1, 2, 3 | 4 | | | | N/A | | |
| Me,max |  | 1, 2, 3 | 8 | | | | N/A | | |
| PDSCH RMC |  | 1 | SR.1.1 CCA | | | | SR.1.1 FDD | | |
| configuration |  | 2 | SR.1.1 CCA | | | | SR.1.1 TDD | | |
|  |  | 3 | SR.1.1 CCA | | | | SR.2.1 TDD | | |
| RMSI CORESET |  | 1 | CR.1.1 CCA | | | | CR.1.1 FDD | | |
| RMC configuration |  | 2 | CR.1.1 CCA | | | | CR.1.1 TDD | | |
|  |  | 3 | CR.1.1 CCA | | | | CR.2.1 TDD | | |
| Dedicated CORESET |  | 1 | CCR.1.1 CCA | | | | CCR.1.1 FDD | | |
| RMC configuration |  | 2 | CCR.1.1 CCA | | | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.1.1 CCA | | | | CCR.2.1 TDD | | |
| OCNG Pattern |  | 1, 2, 3 | OP.1 defined in A.3.2.1 | | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3 | SSB | | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2 | -137 | | | | -140 | | |
|  |  | 3 | -137 | | | | -137 | | |
| Pcompensation | dB | 1, 2, 3 | 0 | | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | | | SS-RSRP | | |
|  | dB | 1 | 14 | 14 | 14 | | -4 | -infinity | 12 |
|  |  | 2 |  |  |  | |  |  |  |
|  |  | 3 |  |  |  | |  |  |  |
| Note2 | dBm/SCS | 1 | -95 | | | -98 | | | |
|  |  | 2 | -95 | | | -98 | | | |
|  |  | 3 | -95 | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | |
|  |  | 2 |  | | | | | | |
|  |  | 3 |  | | | | | | |
|  | dB | 1 | 14 | 14 | 14 | | -4 | -infinity | 12 |
|  |  | 2 |  |  |  | |  |  |  |
|  |  | 3 |  |  |  | |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -81 | -81 | -81 | | -102 | -infinity | -86 |
|  |  | 2 | -81 | -81 | -81 | | -102 | -infinity | -86 |
|  |  | 3 | -81 | -81 | -81 | | -99 | -infinity | -83 |
| Io | dBm/9.36 MHz | 1 | -- | -- | -- | | -68.60 | -70.05 | -57.78 |
|  | dBm/9.36 MHz | 2 | -- | -- | -- | | -68.60 | -70.05 | -57.78 |
|  | dBm/38.16 MHz | 3 | -49.79 | -49.79 | -49.79 | | -62.50 | -63.96 | -51.69 |
| Treselection | s | 1, 2, 3 | 0 | 0 | 0 | | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2, 3 | 50 | | | | 50 | | |
| Threshx, highP | dB | 1, 2, 3 | 48 | | | | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3 | 44 | | | | 44 | | |
| Threshx, lowP | dB | 1, 2, 3 | 50 | | | | 50 | | |
| Propagation Condition |  | 1, 2, 3 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | |

##### A.11.1.3.1.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

1.28 x (5 + Me) + TSI\_CCA s. Me is the number of DRX cycles with at least one SMTC where there are no SSBs available during the Tevaluate,NR\_Intra\_CCA. If Me > Me,max the UE is required to restart the evaluation of cell 2.

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

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate, NR\_ inter + TSI-NR, and to a lower priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR.

Where:

Thigher\_priority\_search See clause 4.2.2.7

Tevaluate, NR\_ inter\_CCA See Table 4.2A.2.4-1 in clause 4.2A.2.4

TSI\_CCA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.

Tevaluate, NR\_ inter See Table 4.2.2.4-1 in clause 4.2.2.4

TSI-NR Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.s

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority cell and 1.28 x (5 + Me) + TSI\_CCA s for the cell re-selection delay to a lower priority cell in the test case.

### A.11.1.4 Inter-RAT cell re-selection to E-UTRAN with source NR carrier frequency under CCA

#### A.11.1.4.1 Cell reselection to higher priority E-UTRAN when serving cell is subject to CCA

##### A.11.1.4.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR cell subject to CCA to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2A.2.5 when the E-UTRAN cell is of higher priority.

##### A.11.1.4.1.2 Test Parameters

The test scenario comprises of one NR cell which is subject to CCA and one E-UTRAN cell as given in tables A.11.1.4.1.2-1, A.11.1.4.1.2-2, A.11.1.4.1.2-3 and A.11.1.4.1.2-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.11.1.4.1.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.11.1.4.1.2-2: General test parameters for NR cell subject to CCA to E-UTRAN cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 | The UE camps on cell 1 in the initial phase and during T2 period the UE reselects to cell 2. |
| T2 end | Active cell |  | 1, 2 | Cell2 | The UE shall perform reselection to cell |
| condition | Neighbour cells |  | 1, 2 | Cell1 | 2 during T2. |
| T3 end | Active cell |  | 1, 2 | Cell1 | The UE shall perform reselection to cell |
| condition | Neighbour cells |  | 1, 2 | Cell2 | 1 during T3 for iteration of the tests. |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | SMTC.1 |  |
| DBT Window Configuration | |  | 1, 2 | DBT.1 | As specified in clause A.3.28.1. |
| SSB configuration | |  |  | Cell 1: SSB.1 CCA for semi-static channel access;  Cell 1: SSB.2 CCA for dynamic channel access; |  |
| DL CCA model | |  | 1, 2 | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | 1, 2 | As specified in clause A.3.26.2.2 |  |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
| 2 | 4 |
| E-UTRAN PRACH | |  | 1 | 53 | As specified in table 5.7.1-2 in |
| configuration index | |  | 2 | 4 | TS 36.211 [23] |
| T1 | | s | 1, 2 | >7 | During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | | s | 1, 2 | 75 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2 | 15 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.11.1.4.1.2-3: Cell specific test parameters for NR cell 1 subject to CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | |
| **T1** | **T2** | **T3** |
| TDD configuration |  | 1, 2 | TDDConf.1.1.CCA | | |
| DL CCA probability for semi-static channel access (PCCA\_DL) |  | 1, 2 | 0.9 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_1) |  | 1, 2 | 0.75 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_2) |  | 1, 2 | 0.5 | | |
| UL CCA probability PCCA\_UL |  | 1, 2 | 1 | | |
| Md,max |  | 1, 2 | 16 | | |
| Mm,max |  | 1, 2 | 4 | | |
| Me,max |  | 1, 2 | 8 | | |
| PDSCH parameters |  | 1, 2 | SR.1.1 CCA | | |
| RMSI CORESET parameters |  | 1, 2 | CR.1.1 CCA | | |
| Dedicated CORESET parameters |  | 1, 2 | CCR.1.1 CCA | | |
| SSB parameters |  | 1, 2 | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access | | |
| NR SMTC parameters |  | 1, 2 | SMTC.1 | | |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0 | | |
| RLM-RS |  | 1, 2 | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2 | -137 | | |
|  | dBm/SCS | 1, 2 | -95 | | |
|  | dBm/15 kHz | 1, 2 | -98 | | |
| SS-RSRP |  | 1, 2 | -81 | -81 | -81 |
|  | dB | 1, 2 | 14 | 14 | 14 |
|  | dB | 1, 2 | 14 | 14 | 14 |
| Io | dBm/38.16 MHz | 1, 2 | -49.79 | -49.79 | -49.79 |
| Treselection | S | 1, 2 | 0 | | |
| Snonintrasearch | dB | 1, 2 | 50 | | |
| Threshx, high (Note 2) | dB | 1, 2 | 48 | | |
| Threshserving, low | dB | 1, 2 | 44 | | |
| Threshx, low | dB | 1, 2 | 50 | | |
| Propagation Condition |  | 1, 2 | 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: This refers to the value of Thresh**x, high** which is included in NR system information, and is a threshold for the E-UTRA target cell  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

Table A.11.1.4.1.2-4: Cell specific test parameters for E-UTRA cell 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 2** | | | |
| **T1** | **T2** | | **T3** |
| E-UTRA RF Channel number |  | 1 | | | |
| BWchannel | MHz | 10 | | | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | | | |
| PBCH\_RA | dB | 0 | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | |
|  | dBm/15 kHz | -98 | | | |
| RSRP | dBm/15 KHz | -infinity | | -86 | -102 |
|  | dB | -infinity | | 12 | -4 |
|  | dB | -infinity | | 12 | -4 |
| TreselectionEUTRAN | S | 0 | | | |
| Snonintrasearch | dB | 50 | | | |
| Threshx, high (Note 2) | dB | 48 | | | |
| Threshserving, low | dB | 44 | | | |
| Threshx, low | dB | 50 | | | |
| 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: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | | | |

##### A.11.1.4.1.3 Test Requirements

The cell reselection delay to a higher priority E-UTRAN cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

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

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate, E-UTRAN + TSI-E-UTRA,

Where:

Thigher\_priority\_search See clause 4.2.2.7

Tevaluate, E-UTRAN See Table 4.2.2.5-1 in clause 4.2.2.5

TSI-E-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority E-UTRAN cell.

#### A.11.1.4.2 Cell reselection to lower priority E-UTRAN when serving cell is subject to CCA

##### A.11.1.4.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR cell subject to CCA to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2A.2.5 when the E-UTRAN cell is of lower priority.

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.11.1.4.2.1-1, A.11.1.4.2.1-2, A.11.1.4.2.1-3 and A.11.1.4.2.1-4. The test consists of three successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.11.1.4.2.1-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.11.1.4.2.1-2: General test parameters for NR cell subject to CCA to E-UTRAN cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 | The UE camps on cell 1 in the initial phase. |
| T1 end condition | Active cell |  | 1, 2 | Cell2 | The UE shall perform reselection to cell 2 during T1. |
| Neighbour cells |  | 1, 2 | Cell1 |
| T2 end condition | Active cell |  | 1, 2 | Cell1 | The UE shall perform reselection to cell 1 during T2 for iteration of the tests. |
| Neighbour cells |  | 1, 2 | Cell2 |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | SMTC.1 |  |
| DBT Window Configuration | |  | 1, 2 | DBT.1 | As specified in clause A.3.28.1. |
| DL CCA model | |  | 1, 2 | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | 1, 2 | As specified in clause A.3.26.2.2 |  |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH | |  | 1 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
| configuration index | |  | 2 | 4 |
| T1 | | s | 1, 2 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2 | 75 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.11.1.4.2.1-3: Cell specific test parameters for NR cell 1 subject to CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | |
| **T1** | **T2** |
| TDD configuration |  | 1, 2 | TDDConf.1.1.CCA | |
| DL CCA probability for semi-static channel access (PCCA\_DL) |  | 1, 2 | 0.9 | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_1) |  | 1, 2 | 0.75 | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_2) |  | 1, 2 | 0.5 | |
| UL CCA probability PCCA\_UL |  | 1, 2 | 1 | |
| Md,max |  | 1, 2 | 16 | |
| Mm,max |  | 1, 2 | 4 | |
| Me,max |  | 1, 2 | 8 | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 CCA | |
| RMSI CORESET RMC  Configuration |  | 1, 2 | CR.1.1 CCA | |
| Dedicated CORESET RMC |  | 1, 2 | CCR.1.1 CCA | |
| Configuration |
| SSB configuration |  | 1, 2 | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access | |
|  |
| SMTC configuration |  | 1, 2 | SMTC.1 | |
|  |
|  |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0 | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0 | |
| RLM-RS |  | 1, 2 | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2 | -137 | |
|  | dBm/SCS | 1, 2 | -95 | |
|  | dBm/15 kHz | 1, 2 | -98 | |
| SS-RSRP | dBm/SCS | 1, 2 | -99 | -83 |
|  | dB | 1, 2 | -4 | 12 |
|  |  |  |  |
|  |  |  |  |
|  | dB | 1, 2 | -4 | 12 |
|  |  |  |  |
|  |  |  |  |
| Io | dBm/38.16 MHz | 1, 2 | -62.50 | -51.69 |
| Treselection | S | 1, 2 | 0 | |
| Snonintrasearch | dB | 1, 2 | 50 | |
| Threshx, high (Note 2) | dB | 1, 2 | 48 | |
| Threshserving, low | dB | 1, 2 | 44 | |
| Threshx, low | dB | 1, 2 | 50 | |
| Propagation Condition |  | 1, 2 | 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: This refers to the value of Thresh**x, high** which is included in NR system information, and is a threshold for the E-UTRA target cell  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | |

Table A.11.1.4.2.1-4: Cell specific test parameters for E-UTRA cell 2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -84 | -84 |
|  | dB | 14 | 14 |
|  | dB | 14 | 14 |
| TreselectionEUTRAN | S | 0 | |
| Snonintrasearch | dB | 50 | |
| Threshx, high (Note 2) | dB | 48 | |
| Threshserving, low | dB | 44 | |
| Threshx, low | dB | 50 | |
| 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: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | |

##### A.11.1.4.2.2 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

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

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: Tevaluate, E-UTRAN + TSI-E-UTRA,

Where:

Tevaluate, E-UTRAN See Table 4.2.2.5-1 in clause 4.2.2.5

TSI-E-UTRA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

### <End of Change 2>

### <Start of Change 3 (R4-2114108)>

### A.11.2.1 Handover

#### A.11.2.1.1 Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA; known target cell

##### A.11.2.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR intra frequency handover requirements from FR1 carrier under CCA to FR1 carrier under CCA specified in clause 6.1B.1.2.

##### A.11.2.1.1.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.1.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.1.2-2, and A.11.2.1.1.2-3.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.11.2.1.1.2-1: Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.2.1.1.2-2: General test parameters Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| DL CCA model | Dynamic channel accessNote 1, 3 |  | As specified in clause A.3.26.2.1 |  |
| Semi-static channel access Note 2, 3 |
| UL CCA model | Dynamic channel access Note 1, 3 |  | As specified in clause A.3.26.2.2 |  |
| Semi-static channel access Note 2,3 |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T304 | | ms | 500 |  |
| LCCA\_DL | |  | 5 |  |
| WCCA\_DL | | ms | T304 |  |
| LCCA\_UL | |  | 5 |  |
| WCCA\_UL | | ms | T304 |  |
| T1 | | s | 5 |  |
| T2 | | s | ≤ 5 |  |
| T3 | | s | ≥ Tinterrupt | Tinterrupt is defined in clause 6.1B.1.2 |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

Table A.11.2.1.1.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | | | Cell 2 | | | | |
|  | | |  | T1 | | T2 | | T3 | | T1 | | T2 | | T3 |
| NR RF Channel Number | | |  | 1 | | | | | | 1 | | | | |
| PCCA\_DL for dynamic channel access Note 4,6 | | | - | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | |
| PCCA\_DL for semi-static channel access Note 5,6 | | | - | PCCA\_DL=0.9375 | | | | | | PCCA\_DL=0.9375 | | | | |
| PCCA\_UL for dynamic channel access Note 4,6 | | | - | 0.75 | | | | | | 0.75 | | | | |
| PCCA\_UL for semi-static channel access Note 5,6 | | | - | 0.87 | | | | | | 0.87 | | | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | | | | | |
| BWchannel | | Config 1 |  | 40: NRB,c = 106 | | | | | | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | | | | | |
| PDSCH Reference | | Config 1 |  | SR.1.1 CCA | | | | | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | | | | | | | | | | |
| Dedicated CORESET RMC configuration | | Config 1 |  | CCR.1.1 CCA | | | | | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 TDD | | | | | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | | | | | |
| DBT window configuration | | Config 1 |  | DBT.1 | | | | | | | | | | |
| SSB configuration for semi-static channel accessNote 4, 6 | | Config 1 |  | SSB.1 CCA | | | | | | | | | | |
| SSB configuration for dynamic channel accessNote 5, 6 | | Config 1 |  | SSB.2 CCA | | | | | | | | | | |
| ssb-PositionQCL | | Config 1 |  | [1] | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 under CCA | | | | | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.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) | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | | | | | |
| Note2 | Config 1 | | dBm/SCS | -95 | | | | | | | | | | |
|  | | | dB | 8 | -3.3 | | -3.3 | | -Infinity | | 2.36 | | 2.36 | |
|  | | | dB | 8 | 8 | | 8 | | -Infinity | | 11 | | 11 | |
| SSB\_RP | Config 1 | | dBm/SCS | -87 | -87 | | -87 | | -Infinity | | -84 | | -84 | |
| IoNote3 | Config 1 | | dBm/  38.16MHz | -55.31 | -50.96 | | -50.96 | | -55.31 | | -50.96 | | -50.96 | |
| 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  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | | | | | | | |

##### A.11.2.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than Tinterrupt from the beginning of time period T3, where Tinterrupt ­is defined in clause 6.1B.1.2

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

Tinterrupt = Tsearch + TIU + Tprocessing + T∆ + Tmargin

Tsearch = 0.

Tprocessing = 20 ms.

Tmargin = 2 ms.

T∆ = (1+ L2) \*20 ms.

TIU = (1+ L3)\*10 + 10 ms

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2], L2 is the number of SMTC occasions not available at the UE during the time tracking period where L2 ≤ LCCA\_DL, and L3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure, where L3 ≤ LCCA\_UL. L3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [33]. The interruption time considering the potential extensions caused by L1,L2 , L3 and by the UL CCA failure detection/recovery mechanism is limited by the T304 timer. The UE behaviour at the T304 timer expiry is detailed in TS 38.331 [2].Test equipment should make sure that LCCA\_DL and LCCA\_UL are not exceeded during a test by monitoring the number of CCA failures and preventing additional CCA failures from happening after LCCA\_DL or LCCA\_UL is reached.

#### A.11.2.1.2 Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA; unknown target cell

##### A.11.2.1.2.1 Test Purpose and Environment

This test is to verify the requirement intra frequency handover requirements from FR1 carrier under CCA to FR1 carrier under CCA specified in clause 6.1B.1.2.

##### A.11.2.1.2.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.2.2-2, and A.11.2.1.2.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.11.2.1.2.2-1: Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.2.1.2.2-2: General test parameters Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| DL CCA model | Dynamic channel accessNote 1, 3 |  | As specified in clause A.3.26.2.1 |  |
| Semi-static channel access Note 2, 3 |
| UL CCA model | Dynamic channel access Note 1, 3 |  | As specified in clause A.3.26.2.2 |  |
| Semi-static channel access Note 2,3 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T304 | | ms | 500 |  |
| LCCA\_DL | |  | 5 |  |
| WCCA\_DL | | ms | T304 |  |
| LCCA\_UL | |  | 5 |  |
| WCCA\_UL | | ms | T304 |  |
| T1 | | s | 5 |  |
| T2 | | s | ≥ Tinterrupt | Tinterrupt is defined in clause 6.1B.1.2 |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic  channel occupancy only. | | | | |

Table A.11.2.1.2.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 1 | | |
| PCCA\_DL for dynamic channel access Note 4,6 | | | - | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | |
| PCCA\_DL for semi-static channel access Note 5,6 | | | - | PCCA\_DL=0.9375 | | | | PCCA\_DL=0.9375 | | |
| PCCA\_UL for dynamic channel access Note 4,6 | | | - | 0.75 | | | | 0.75 | | |
| PCCA\_UL for semi-static channel access Note 5,6 | | | - | 0.87 | | | | 0.87 | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | |
| BWchannel | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference | | Config 1 |  | SR.1.1 CCA | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | | | | | | |
| Dedicated CORESET RMC configuration | | Config 1 |  | CCR.1.1 CCA | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | |
| DBT window configuration | | Config 1 |  | DBT.1 | | | | | | |
| SSB configuration for semi-static channel access Note 4, 6 | | Config 1 |  | SSB.1 CCA | | | | | | |
| SSB configuration for dynamic channel access Note 5, 6 | | Config 1 |  | SSB.2 CCA | | | | | | |
| ssb-PositionQCL | | Config 1 |  | [1] | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 under CCA | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.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) | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | |
| Note2 | Config 1 | | dBm/SCS | -95 | | | | | | |
|  | | | dB | 8 | -0.64 | | -Infinity | | -0.64 | |
|  | | | dB | 8 | 8 | | -Infinity | | 8 | |
| SSB\_RP | Config 1 | | dBm/SCS | -87 | -87 | | -Infinity | | -87 | |
| IoNote3 | Config 1 | | dBm/  38.16MHz | -55.31 | -52.60 | | -55.31 | | -52.60 | |
| 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  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | | | |

##### A.11.2.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than Tinterrupt from the beginning of time period T3, where Tinterrupt ­is defined in clause 6.1B.1.2

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

Tinterrupt = Tsearch + TIU + Tprocessing + T∆ + Tmargin

Tsearch = (1+L1)\* 20 ms.

Tprocessing = 20 ms.

Tmargin = 2 ms.

T∆ = (1+ L2) \*20 ms.

TIU = (1+ L3)\*10 + 10 ms

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2], L1 is the number of SMTC occasions not available at the UE during the intra-frequency detection period, L2 is the number of SMTC occasions not available at the UE during the time tracking period, where L1 + L2 ≤ LCCA\_DL, and L3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure, where L3 ≤ LCCA\_UL. L3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [33]. The interruption time considering the potential extensions caused by L1,,L2 , L3 and by the UL CCA failure detection/recovery mechanism is limited by the T304 timer.

#### A.11.2.1.3 Inter-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA; unknown target cell

##### A.11.2.1.3.1 Test Purpose and Environment

This test is to verify the requirement for inter frequency handover requirements from FR1 carrier under CCA to FR1 carrier under CCA specified in clause 6.1B.1.2.

##### A.11.2.1.3.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.3.2-2, and A.11.2.1.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.11.2.1.3.2-1: Inter-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.2.1.3.2-2: General test parameters Inter-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| DL CCA model | Dynamic channel accessNote 1, 3 |  | As specified in clause A.3.26.2.1 |  |
| Semi-static channel access Note 2, 3 |
| UL CCA model | Dynamic channel access Note 1, 3 |  | As specified in clause A.3.26.2.2 |  |
| Semi-static channel access Note 2,3 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T304 | | ms | 500 |  |
| LCCA\_DL | |  | 5 |  |
| WCCA\_DL | | ms | T304 |  |
| LCCA\_UL | |  | 5 |  |
| WCCA\_UL | | ms | T304 |  |
| T1 | | s | 5 |  |
| T2 | | s | ≤ Tinterrupt | Tinterrupt is defined in clause 6.1B.1.2 |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic  channel occupancy only. | | | | |

Table A.11.2.1.3.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| PCCA\_DL for dynamic channel access Note 4,6 | | | - | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | |
| PCCA\_DL for semi-static channel access Note 5,6 | | | - | PCCA\_DL=0.9375 | | | | PCCA\_DL=0.9375 | | |
| PCCA\_UL for dynamic channel access Note 4,6 | | | - | 0.75 | | | | 0.75 | | |
| PCCA\_UL for semi-static channel access Note 5,6 | | | - | 0.87 | | | | 0.87 | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | |
| BWchannel | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference | | Config 1 |  | SR.1.1 CCA | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR1.1 CCA | | | | | | |
| Dedicated CORESET RMC configuration | | Config 1 |  | CCR.1.1 CCA | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | |
| DBT window configuration | | Config 1 |  | DBT.1 | | | | | | |
| SSB configuration for semi-static channel access Note 4, 6 | | Config 1 |  | SSB.1 CCA | | | | | | |
| SSB configuration for dynamic channel access Note 5, 6 | | Config 1 |  | SSB.2 CCA | | | | | | |
| ssb-PositionQCL | | Config 1 |  | [1] | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 under CCA | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.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) | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | |
| Note2 | Config 1 | | dBm/SCS | -95 | | | | | | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
| SSB\_RP | Config 1 | | dBm/SCS | -91 | -91 | | -Infinity | | -90 | |
| IoNote3 | Config 1 | | dBm/  38.16MHz | -58.49 | -58.49 | | -63.94 | | -57.75 | |
| 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  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | | | |

##### A.11.2.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than Tinterrupt from the beginning of time period T3, where Tinterrupt ­is defined in clause 6.1B.1.2

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

Tinterrupt = Tsearch + TIU + Tprocessing + T∆ + Tmargin

Tsearch = (3+L1’)\* 20 ms.

Tprocessing = 20 ms.

Tmargin = 2 ms.

T∆ = (1+ L2) \*20 ms.

TIU = (1+ L3)\*10 + 10 ms

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2], L1’is the number of SMTC occasions not available at the UE during the inter-frequency detection period, L2 is the number of SMTC occasions not available at the UE during the time tracking period, where L1’ + L2 ≤ LCCA\_DL, and L3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure, where L3 ≤ LCCA\_UL. L3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [33]. The interruption time considering the potential extensions caused by ,L1´,L2 , L3 and by the UL CCA failure detection/recovery mechanism is limited by the T304 timer.

#### A.11.2.1.4 Inter-frequency handover from FR1 carrier under CCA to FR1; known target cell

##### A.11.2.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the NR with CCA FR1-NR FR1 handover requirements specified in clause 6.1.1.2.

##### A.11.2.1.4.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.4.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.4.2-2, and A.11.2.1.4.2-3.

The test consists of three successive time periods, with time durations of T1 T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR with CCA shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.11.2.1.4.2-1: Handover from NR with CCA FR1 to NR FR1 test configuration

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: 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.11.2.1.4.2-2: General test parameters handover from NR with CCA FR1 to NR FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | NR cell with CCA |
|  | Neighbouring cell |  | Cell 2 | NR cell |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.26.2.2 |  |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.11.2.1.4.2-3: Cell specific test parameters for NR with CCA FR1 – NR FR1 handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test | Cell 1 | | | Cell 2 | | |
|  | | |  | configuration | T1 | T2 | T3 | T1 | T2 | T3 |
| NR RF Channel Number | | |  | 1,2,3 | 1 | | | 2 | | |
| Duplex mode | | |  | 1 | TDD | | | FDD | | |
|  | | |  | 2 | TDD | | | TDD | | |
|  | | |  | 3 | TDD | | | TDD | | |
| TDD configuration | | |  | 1 | TDDConf.1.1 CCA | | | Not Applicable | | |
|  | | |  | 2 | TDDConf.1.1 CCA | | | TDDConf.1.1 | | |
|  | | |  | 3 | TDDConf.1.1 CCA | | | TDDConf.2.1 | | |
| BWchannel | | | MHz | 1 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | | |
|  | | |  | 2 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | | |
|  | | |  | 3 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | | |
| BWP BW | | | MHz | 1 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | | |
|  | | |  | 2 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | | |
|  | | |  | 3 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | | |
| DRX Cycle | | | ms | 1,2,3 | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | |  | 1 | SR.1.1 CCA | | | SR.1.1 FDD | | |
|  | | |  | 2 | SR.1.1 CCA | | | SR.1.1 TDD | | |
|  | | |  | 3 | SR.1.1 CCA | | | SR2.1 TDD | | |
| CORESET Reference Channel | | |  | 1 | CR1.1 CCA | | | CR.1.1 FDD | | |
|  | | |  | 2 | CR1.1 CCA | | | CR.1.1 TDD | | |
|  | | |  | 3 | CR1.1 CCA | | | CR2.1 TDD | | |
| Dedicated CORESET RMC configuration | | |  | 1 | CCR.1.1 CCA | | | CCR.1.1 FDD | | |
|  | 2 | CCR.1.1 CCA | | | CCR.1.1 TDD | | |
|  | 3 | CCR.1.1 CCA | | | CCR.2.1 TDD | | |
| DL CCA probability for semi-static channel access (PCCA\_DL)DL CCA probability PCCA\_DL | | |  | 1,2,3 | 0.9375 | | | N/A | | |
| DL CCA probability for dynamic channel access (PCCA\_DL\_1) | | |  | 1,2,3 | 0.75 | | | N/A | | |
| DL CCA probability for dynamic channel access (PCCA\_DL\_2) | | |  | 1,2,3 | 0.75 | | | N/A | | |
| UL CCA probability for semi-static channel access PCCA\_UL | | |  | 1,2,3 | 0.75 | | | N/A | | |
| UL CCA probability for dynamic static channel access PCCA\_UL | | |  | 1,2,3 | 0.87 | | |  | | |
| TRS configuration | | |  | 1 | TRS.1.2 TDD | | | TRS.1.1 FDD | | |
|  | | |  | 2 | TRS.1.2 TDD | | | TRS.1.1 TDD | | |
|  | | |  | 3 | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| OCNG Patterns | | |  |  | OP.1 | | | | | |
| SMTC Configuration | | |  |  | SMTC.1 | | | | | |
| SSB Configuration | | Semi-static channel access |  | 1,2 | SSB.1 CCA  (As defined in A.3.10A ) | | | SSB.1 FR1 | | |
| Dynamic channel access |  |  | SSB.2 CCA  (As defined in A.3.10A ) | | |  | | |
|  | | Semi-static channel access |  | 3 | SSB.1 CCA  (As defined in A.3.10A ) | | | SSB.2 FR1 | | |
|  | | Dynamic channel access |  |  | SSB.2 CCA  (As defined in A.3.10A ) | | |  | | |
| DBT window configuration | | |  |  | As defined in A.3.28.1 | | | Not applicable | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 1,2 | 30 kHz | | | 15 kHz | | |
|  | | |  | 3 | 30 kHz | | | 30 kHz | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 1,2 | 30 kHz | | | 15 kHz | | |
|  | | |  | 3 | 30 kHz | | | 30 kHz | | |
| PRACH configuration | | |  |  | FR1 PRACH configuration 1 under CCA | | | FR1 PRACH configuration 1 | | |
| BWP configuration | | Initial DL BWP |  | 1,2,3 | DLBWP.0.1 | | | | | |
|  | | Dedicated DL BWP |  | 1,2,3 | DLBWP.1.1 | | | | | |
|  | | Initial UL BWP |  | 1,2,3 | ULBWP.0.1 | | | | | |
|  | | Dedicated UL BWP |  | 1,2,3 | ULBWP.1.1 | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 1,2,3 | 0 | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | 1,2,3 |
| EPRE ratio of PBCH to PBCH DMRS | | | 1,2,3 |
| EPRE ratio of PDCCH DMRS to SSS | | | 1,2,3 |
| EPRE ratio of PDCCH to PDCCH DMRS | | | 1,2,3 |
| EPRE ratio of PDSCH DMRS to SSS | | | 1,2,3 |
| EPRE ratio of PDSCH to PDSCH | | | 1,2,3 |
| EPRE ratio of OCNG DMRS to SSSNote1 | | | 1,2,3 |
| EPRE ratio of OCNG to OCNG DMRSNote1 | | | 1,2,3 |
| Note2 | | | dBm/SCS | 1,2 | [-101] | | | -98 | | |
|  | | |  | 3 | [-101] | | | -95 | | |
|  | | | dB | 1,2,3 | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
|  | | | dB | 1,2,3 | 8 | 8 | 8 | -Infinity | 11 | 11 |
| SSB\_RP | Config 1 | | dBm/SCS | 1,2,3 | -90 | -90 | -90 | -Infinity | -87 | -87 |
| IoNote3 | Config 1 | | dBm/  9.36MHz | 1,2,3 | -61.41 | -57.06 | -57.06 | -61.41 | -57.06 | -57.06 |
| Propagation condition | | | - | 1,2,3 | 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  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | | |

##### A.11.2.1.4.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 112 ms from the beginning of time period T3.

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt = 102 ms in the test. Tinterrupt is defined in clause 6.1.1.2.2.

This gives a total of 112 ms.

#### A.11.2.1.5 Inter-frequency handover from FR1 carrier under CCA to FR1; unknown target cell

##### A.11.2.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the NR with CCA FR1-NR FR1 handover requirements specified in clause 6.1.1.2.

##### A.11.2.1.5.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.5.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.5.2-2, and A.12.2.1.7.2-3.

The test scenario comprises of two carriers and one cell on each carrier. Cell 1 is the NR with CCA cell and Cell 2 is an NR neighbour cell. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2.

Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.11.2.1.5.2-1: Handover from NR with CCA FR1 to NR FR1 test configuration

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: 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.11.2.1.5.2-2: General test parameters handover from NR with CCA FR1 to NR FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | NR cell with CCA |
|  | Neighbouring cell |  | Cell 2 | NR cell |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.26.2.2 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |

Table A.11.2.1.5.2-3: Cell specific test parameters for NR with CCA FR1 – NR FR1 handover test case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | | | Cell 2 | |
|  |  |  | T1 | T2 | | T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3 | 1 | | | 2 | |
| Duplex mode |  | 1 | TDD | | | FDD | |
|  | 2 | TDD | | | TDD | |
|  | 3 | TDD | | | TDD | |
| DL CCA model |  | 1, 2, 3 | As specified in clause A.3.26.2.1 | | | N/A | |
| UL CCA model |  | 1, 2, 3 | As specified in clause A.3.26.2.2 | | |  | |
| TDD configuration |  | 1 | TDDConf.1.1 CCA | | | Not Applicable | |
|  | 2 | TDDConf.1.1 CCA | | | TDDConf.1.1 | |
|  | 3 | TDDConf.1.1 CCA | | | TDDConf.2.1 | |
| BWchannel | MHz | 1 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | |
| 2 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | |
| 3 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | |
| BWP BW | MHz | 1 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | |
| 2 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | |
| 3 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | |
| DRX Cycle | ms |  | Not Applicable | | | | |
| PDSCH Reference measurement channel |  | 1 | SR.1.1 CCA | | | SR.1.1 FDD | |
|  | 2 | SR.1.1 CCA | | | SR.1.1 TDD | |
|  | 3 | SR.1.1 CCA | | | SR2.1 TDD | |
| CORESET Reference Channel |  | 1 | CR2.1 TDD | | | CR.1.1 FDD | |
|  | 2 | CR2.1 TDD | | | CR.1.1 TDD | |
|  | 3 | CR2.1 TDD | | | CR2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 CCA | | | CCR.1.1 FDD | |
|  | 2 | CCR.1.1 CCA | | | CCR.1.1 TDD | |
|  | 3 | CCR.1.1 CCA | | | CCR.2.1 TDD | |
| TRS configuration |  | 1 | TRS.1.2 TDD | | | TRS.1.1 FDD | |
|  | 2 | TRS.1.2 TDD | | | TRS.1.1 TDD | |
|  | 3 | TRS.1.2 TDD | | | TRS.1.2 TDD | |
| DL CCA probability for semi-static channel access (PCCA\_DL)DL CCA probability PCCA\_DL |  | 1, 2, 3 | 0.9375 | | | N/A | |
| DL CCA probability for dynamic channel access (PCCA\_DL\_1) |  | 1, 2, 3 | 0.75 | | | N/A | |
| DL CCA probability for dynamic channel access (PCCA\_DL\_2) |  | 1, 2, 3 | 0.75 | | | N/A | |
| UL CCA probability for semi-static channel access PCCA\_UL |  | 1, 2, 3 | 0.75 | | | N/A | |
| UL CCA probability for dynamic static channel access PCCA\_UL |  | 1, 2, 3 | 0.87 | | | N/A | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | | | |
| SMTC Configuration |  | 1, 2, 3 | SMTC.1 | | | | |
| DBT window configuration |  | 1, 2, 3 | As defined in A.3.28.1 | | | N/A | |
| SSB configuration | Semi-static channel access | 1,2 | SSB.1 CCA  (As defined in A.3.10A ) | | | SSB.1 FR1 | |
| Dynamic channel access |  | SSB.2 CCA  (As defined in A.3.10A ) | | |
| Semi-static channel access | 3 | SSB.1 CCA  (As defined in A.3.10A ) | | | SSB.2 FR1 | |
| Dynamic channel access |  | SSB.2 CCA  (As defined in A.3.10A ) | | |
| ssb-PositionQCL |  |  | [1] | | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 30 kHz | | | 15 kHz | |
| 2 | 30 kHz | | | 15 kHz | |
| 3 | 30 kHz | | | 30 kHz | |
| PUCCH/PUSCH subcarrier spacing | kHz | 1 | 30 kHz | | | 15 kHz | |
| 2 | 30 kHz | | | 15 kHz | |
| 3 | 30 kHz | | | 30 kHz | |
| PRACH configuration |  | 1,2,3 | FR1 PRACH configuration 1 | | FR1 PRACH configuration 1 under CCA | | |
| BWP configuration | Initial DL BWP | 1,2,3 | DLBWP.0.1 | | | | |
| Dedicated DL BWP | 1,2,3 | DLBWP.1.1 | | | | |
| Initial UL BWP | 1,2,3 | ULBWP.0.1 | | | | |
| Dedicated UL BWP | 1,2,3 | ULBWP.1.1 | | | | |
| EPRE ratio of PSS to SSS | dB | 1,2,3 | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | 1,2,3 |
| EPRE ratio of PBCH to PBCH DMRS | 1,2,3 |
| EPRE ratio of PDCCH DMRS to SSS | 1,2,3 |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2,3 |
| EPRE ratio of PDSCH DMRS to SSS | 1,2,3 |
| EPRE ratio of PDSCH to PDSCH | 1,2,3 |
| EPRE ratio of OCNG DMRS to SSSNote1 | 1,2,3 |
| EPRE ratio of OCNG to OCNG DMRSNote1 | 1,2,3 |
| Note2 | dBm/SCS | 1,2,3 | [-101] | | | -98 | |
|  | [-101] | | | -95 | |
|  | dB | 1,2,3 | -Infinity | 5 | | 4 | 4 |
|  | dB | 1,2,3 | -Infinity | 5 | | 4 | 4 |
| SSB\_RP | dBm/SCS | 1,2,3 | -Infinity | -93 | | -94 | -94 |
|  | -Infinity | -90 | | -91 | -91 |
| IoNote3 | dBm/  9.36MHz | 1,2,3 | -70.05 | -63.85 | | -64.59 | -64.59 |
|  | dBm/  38.16MHz | 1,2,3 | -63.94 | -57.75 | | -58.49 | -58.49 |
| Propagation condition | - | 1,2,3 | 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  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | |

##### A.11.2.1.5.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 132 ms from the beginning of time period T2.

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

Tinterrupt = 122 ms in the test. Tinterrupt is defined in clause 6.1.1.2.2.

This gives a total of 132 ms.

#### A.11.2.1.6 Inter-frequency handover from FR1 to FR1 carrier under CCA; unknown target cell

##### A.11.2.1.6.1 Test Purpose and Environment

This test is to verify the requirement for inter frequency handover requirements from FR1 to FR1 carrier under CCA specified in clause 6.1B.1.2.

##### A.11.2.1.6.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.6.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.6.2-2, and A.11.2.1.6.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.11.2.1.6.2-1: Inter-frequency handover from FR1 to FR1 carrier under CCA test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 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.11.2.1.6.2-2: General test parameters Inter-frequency handover from FR1 to FR1 carrier under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| DL CCA model | |  | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.26.2.2 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 5 |  |
| T2 | | s | ≤ Tinterrupt | Tinterrupt is defined in clause 6.1B.1.2 |

Table A.11.2.1.6.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | Cell 2 | | |
|  | |  |  | T1 | T2 | T1 | | T2 |
| NR RF Channel Number | |  | 1, 2, 3 | 1 | | 2 | | |
| DL CCA probability for semi-static channel access (PCCA\_DL)DL CCA probability PCCA\_DL | |  | 1, 2, 3 | N/A | | 0.9375 | | |
| DL CCA probability for dynamic channel access (PCCA\_DL\_1) | |  | 1, 2, 3 | N/A | | 0.75 | | |
| DL CCA probability for dynamic channel access (PCCA\_DL\_2) | |  | 1, 2, 3 | N/A | | 0.75 | | |
| UL CCA probability for semi-static channel access PCCA\_UL | |  | 1, 2, 3 | N/A | | 0.75 | | |
| UL CCA probability for dynamic static channel access PCCA\_UL | |  | 1, 2, 3 | N/A | | 0.87 | | |
| TDD configuration | |  | 1 | N/A | | TDDConf.1.1.CCA | | |
|  | 2 | TDDConf.1.1 | | TDDConf.1.1.CCA | | |
|  | 3 | TDDConf.1.2 | | TDDConf.1.1.CCA | | |
| BWchannel | |  | 1 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | 2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | |
| BWP BW | |  | 1 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | 2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | |
| DRX Cycle | | ms |  | Not Applicable | | | | |
| PDSCH Reference | |  | 1 | SR.1.1 FDD | | SR.1.1 CCA | | |
|  | 2 | SR.1.1 TDD | | SR.1.1 CCA | | |
|  | 3 | SR.2.1 TDD | | SR.1.1 CCA | | |
| CORESET Reference Channel | |  | 1 | CR.1.1 FDD | | CR.1.1 CCA | | |
|  | 2 | CR.1.1 TDD | | CR.1.1 CCA | | |
|  | 3 | CR.2.1 TDD | | CR.1.1 CCA | | |
| Dedicated CORESET RMC configuration | |  | 1 | CCR.1.1 FDD | | CCR.1.1 CCA | | |
|  | 2 | CCR.1.1 TDD | | CCR.1.1 CCA | | |
|  | 3 | CCR.2.1 TDD | | CCR.1.1 CCA | | |
| TRS configuration | |  | 1 | TRS.1.1 FDD | | TRS.1.2 TDD | | |
|  | 2 | TRS.1.1 TDD | | TRS.1.2 TDD | | |
|  | 3 | TRS.1.2 TDD | | TRS.1.2 TDD | | |
| OCNG Patterns | |  | 1, 2, 3 | OP.1 | | | | |
| SMTC Configuration | |  | 1, 2, 3 | SMTC.1 | | | | |
| DBT window configuration | |  | 1, 2, 3 | N/A | | As defined in A.3.28.1 | | |
| SSB configuration | |  | 1, 2 | SSB.1 FR1 | | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access; | | |
|  | 3 | SSB.2 FR1 | | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access; | | |
| ssb-PositionQCL | |  |  | N/A | | [1] | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 15 kHz | | 30 kHz | | |
| 2 | 15 kHz | | 30 kHz | | |
| 3 | 30 kHz | | 30 kHz | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 1 | 15 kHz | | 30 kHz | | |
| 2 | 15 kHz | | 30 kHz | | |
| 3 | 30 kHz | | 30 kHz | | |
| PRACH configuration | |  |  | FR1 PRACH configuration 1 | | | FR1 PRACH configuration 1 CCA | |
| BWP configuration | Initial DL BWP |  | 1, 2, 3 | DLBWP.0.1 | | | | |
|  | Dedicated DL BWP |  | 1, 2, 3 | DLBWP.1.1 | | | | |
|  | Initial UL BWP |  | 1, 2, 3 | ULBWP.0.1 | | | | |
|  | Dedicated UL BWP |  | 1, 2, 3 | ULBWP.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) | |  |
| Note2 | | dBm/15kHz |  | -98 | | | | |
| Note2 | Config 1 | dBm/SCS | 1, 2 | -98 | | | | |
|  | 3 | -95 | | | | |
|  | | dB |  | 4 | 4 | -Infinity | | 5 |
|  | | dB |  | 4 | 4 | -Infinity | | 5 |
| SSB\_RP | Config 1 | dBm/SCS | 1, 2 | -94 | -94 | -Infinity | | -93 |
|  | 3 | -91 | -91 | -Infinity | | -90 |
| IoNote3 | Config 1 | dBm/  9.36MHz | 1, 2 | -64.59 | -64.59 | -70.05 | | -63.85 |
|  | dBm/  38.16MHz | 3 | -58.49 | -58.49 | -63.94 | | -57.75 |
| 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  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | |

##### A.11.2.1.6.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than Tinterrupt from the beginning of time period T3, where Tinterrupt ­is defined in clause 6.1B.1.2

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2], L1’is the number of SMTC occasions not available at the UE during the inter-frequency detection period, L2 is the number of SMTC occasions not available at the UE during the time tracking period, and L3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. L3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [33]. The interruption time considering the potential extensions caused by L1,L1´,L2 , L3 and by the UL CCA failure detection/recovery mechanism is limited by the T304 timer. The UE behaviour at the T304 timer expiry is detailed in TS 38.331 [2].

#### A.11.2.1.7 SA NR FR1 carrier under CCA - E-UTRAN handover with known target cell

##### A.11.2.1.7.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1 carrier under CCA. This test shall verify the NR to E-UTRAN handover requirements as specified in clause 6.1.2.1.

The test comprises of one NR carrier under CCA and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.11.2.1.7-1. General test parameters are provided in Table A.11.2.1.7-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.11.2.1.7-3 and A.11.2.1.7-4 respectively.

Table A.11.2.1.7-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD 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 only on NR band(s) with shared spectrum access is required to be tested. | | |

Table A.11.2.1.7-2: General test parameters for SA inter-RAT E-UTRAN handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | NR cell on a carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | E-UTRAN cell |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.26.2.2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | As specified in Table A.11.2.1.7-3 | Absolute NR SS-RSRP threshold for event B2 |
| b2-Threshold2EUTRAN | | dBm | -98 | Absolute E-UTRAN RSRP threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 9.1.2-1 started before T2 starts |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.11.2.1.7-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | |
|  | |  |  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2 | 1 | | |
| TDD Configuration | |  | 1, 2 | TDDConf.1.1.CCA | | |
| DL CCA probability for semi-static channel access (PCCA\_DL)DL CCA probability PCCA\_DL | |  | 1, 2 | 0.9375 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_1) | |  | 1, 2 | 0.75 | | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_2) | |  | 1, 2 | 0.75 | | |
| UL CCA probability for semi-static channel access PCCA\_UL | |  | 1, 2 | 0.75 | | |
| UL CCA probability for dynamic static channel access PCCA\_UL | |  | 1, 2 | 0.87 | | |
| BWchannel | |  | 1, 2 | 40: NRB,c = 106 (TDD) | | |
| PDSCH reference measurement channel | |  | 1, 2 | SR.1.1 CCA | | |
| CORESET reference channel | |  | 1, 2 | CR.1.1 CCA | | |
| Dedicated CORESET RMC configuration | |  | 1, 2 | CCR.1.1 CCA | | |
| TRS configuration | |  | 1, 2 | TRS.1.2 TDD | | |
| OCNG patternNote1 | |  | 1, 2 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2 | DLBWP.0.1 | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | |
| SMTC configuration | |  | 1, 2 | SMTC.1 | | |
| DBT window configuration | |  | 1, 2 | As defined in A.3.28.1 | | |
| SSB configuration | |  | 1, 2 | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access; | | |
| b2-Threshold1 | | dBm | 1, 2 | -93 | | |
| 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\_DMRS | |  |  |  | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2 | -100 | -104 | -100 |
| *Noc*Note2 | | dBm/SCS | 1, 2 | -97 | -101 | -97 |
| Ês/Noc | | dB | 1, 2 | 12 | 0 | -4 |
| Ês/IotNote3 | | dB | 1, 2 | 12 | 0 | -4 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2 | -85 | -101 | -101 |
| IoNote3 | | dBm/38.16 MHz | 1, 2 | -53.68 | -66.9448 | -64.49 |
| Propagation condition | |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2 | 1x2 Low | | |
| 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: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | |

Table A.11.2.1.7-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | | |
|  |  |  | T1 | T2 | T3 |
| RF channel number |  | 1, 2 | 2 | | |
| Duplex mode |  | 1 | FDD | | |
| 2 | TDD | | |
| TDD special subframe configurationNote1 |  | 2 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | | |
| BWchannel | MHz | 1, 2 | 10 MHz: NRB,c = 50 | | |
| PRACH ConfigurationNote2 |  | 1 | 4 | | |
|  |  | 2 | 53 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1 | 10 MHz: R.3 FDD | | |
|  |  | 2 | 10 MHz: R.0 TDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1 | 10 MHz: R.6 FDD | | |
|  |  | 2 | 10 MHz: R.6 TDD | | |
| OCNG PatternsNote3 |  | 1 | 10 MHz: OP.10 FDD | | |
|  |  | 2 | 10 MHz: OP.1 TDD | | |
| PBCH\_RA | dB | 1, 2 | 0 | | |
| PBCH\_RB |  |  |  | | |
| PSS\_RA |  |  |  | | |
| SSS\_RA |  |  |  | | |
| PCFICH\_RB |  |  |  | | |
| PHICH\_RA |  |  |  | | |
| PHICH\_RB |  |  |  | | |
| PDCCH\_RA |  |  |  | | |
| PDCCH\_RB |  |  |  | | |
| PDSCH\_RA |  |  |  | | |
| PDSCH\_RB |  |  |  | | |
| OCNG\_RANote4 |  |  |  | | |
| OCNG\_RBNote4 |  |  |  | | |
| NocNote5 | dBm/15kHz | 1, 2 | -98 | | |
| Ês/Noc | dB | 1, 2 | -Infinity | 8 | 78 |
| Ês/IotNote6 | dB | 1, 2 | -Infinity | 78 | 78 |
| RSRPNote6 | dBm/15kHz | 1, 2 | -Infinity | -90 | -90 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2 | -Infinity | -90 | -90 |
| IoNote6 | dBm/9MHz | 1, 2 | -67.21  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) |
| Propagation Condition |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2 | 1x2 Low | | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: 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 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | | |

##### A.11.2.1.7.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

Tinterrupt = 35 ms in the test; Tinterrupt is defined in clause 6.1.2.1.

This gives a total of 85 ms.

#### A.11.2.1.8 SA NR FR1 carrier under CCA - E-UTRAN handover with unknown target cell

##### A.11.2.1.8.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1 carrier under CCA. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in clause 6.1.2.1.

The test comprises of one NR carrier under CCA and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable. No Gap pattern shall be configured.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.11.2.1.8-1. General test parameters are provided in Table A.11.2.1.8-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.11.2.1.8-3 and A.11.2.1.8-4 respectively.

Table A.11.2.1.8-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, TDD duplex mode |
| 2 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | LTE 10 MHz bandwidth, FDD 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 only on NR band(s) with shared spectrum access is required to be tested. | | |

Table A.11.2.1.8-2: General test parameters for SA inter-RAT E-UTRAN handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | NR cell on a carrier under CCA |
| Neighbouring cell |  | Cell 2 | E-UTRAN cell |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.26.2.2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | ≤5 |  |
| T2 | | s | 1 |  |

Table A.11.2.1.8-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Configuration** | **Cell 1** | |
| **T1** | **T2** |
| RF channel number | |  | 1, 2 | 1 | |
| DL CCA probability for semi-static channel access (PCCA\_DL)DL CCA probability PCCA\_DL | |  | 1, 2 | 0.9375 | |
| DL CCA probability for dynamic channel access (PCCA\_DL\_1) | |  | 1, 2 | 0.75 | |
| DL CCA probability for dynamic channel access (PCCA\_DL\_2) | |  | 1, 2 | 0.75 | |
| UL CCA probability for semi-static channel access PCCA\_UL | |  | 1, 2 | 0.75 | |
| UL CCA probability for dynamic static channel access PCCA\_UL | |  | 1, 2 | 0.87 | |
| TDD Configuration | |  | 1, 2 | TDDConf.1.1.CCA | |
| BWchannel | | MHz | 1, 2 | 40: NRB,c = 106 (TDD) | |
| PDSCH reference measurement channel | |  | 1, 2 | SR.1.1 CCA | |
| CORESET reference channel | |  | 1, 2 | CR.1.1 CCA | |
| Dedicated CORESET RMC configuration | |  | 1, 2 | CCR.1.1 CCA | |
| TRS configuration | |  | 1, 2 | TRS.1.2 TDD | |
| OCNG patternNote1 | |  | 1, 2 | OP.1 | |
| BWP | Initial DL BWP |  | 1, 2 | DLBWP.0.1 | |
| Dedicated DL BWP | DLBWP.1.1 | |
| Initial UL BWP | ULBWP.0.1 | |
| Dedicated UL BWP | ULBWP.1.1 | |
| SMTC configuration | |  | 1, 2 | SMTC.1 | |
| DBT window configuration | |  | 1, 2 | As defined in A.3.28.1 | |
| SSB configuration | |  | 1, 2 | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access; | |
| 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\_DMRS | |
| EPRE ratio of OCNG DMRS to SSS | |
| EPRE ratio of OCNG to OCNG DMRS | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2 | -98 | |
| *Noc*Note2 | | dBm/SCS | 1, 2 | -95 | |
| Ês/Noc | | dB | 1, 2 | 0 | 0 |
| Ês/IotNote3 | | dB | 1, 2 | 0 | 0 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2 | -95 | -95 |
| IoNote3 | | dBm/38.16 MHz | 1, 2 | -60.94 | -60.94 |
| Propagation condition | |  | 1, 2 | AWGN | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2 | 1x2 Low | |
| 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: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

Table A.11.2.1.8-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | |
| T1 | T2 |
| RF channel number |  | 1, 2 | 2 | |
| Duplex mode |  | 1 | FDD | |
| 2 | TDD | |
| TDD special subframe configurationNote1 |  | 2 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | |
| BWchannel | MHz | 1, 2 | 10 MHz: NRB,c = 50 | |
| PRACH ConfigurationNote2 |  | 1 | 4 | |
| 2 | 53 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1 | 10 MHz: R.3 FDD | |
| 2 | 10 MHz: R.0 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1 | 10 MHz: R.6 FDD | |
| 2 | 10 MHz: R.6 TDD | |
| OCNG PatternsNote3 |  | 1 | 10 MHz: OP.10 FDD | |
| 2 | 10 MHz: OP.1 TDD | |
| PBCH\_RA | dB | 1, 2 | 0 | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote4 |
| OCNG\_RBNote4 |
| NocNote5 | dBm/15kHz | 1, 2 | -98 | |
| Ês/Noc | dB | 1, 2 | -Infinity | 7 |
| Ês/IotNote6 | dB | 1, 2 | -Infinity | 7 |
| RSRPNote6 | dBm/15kHz | 1, 2 | -Infinity | -91 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2 | -Infinity | -91 |
| IoNote6 | dBm/9MHz | 1, 2 | -70.22 | -62.43 |
| Propagation Condition |  | 1, 2 | AWGN | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: 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 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

##### A.11.2.1.8.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 165 ms from the beginning of time period T2.

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

Tinterrupt = 115 ms in the test; Tinterrupt is defined in clause 6.1.2.1.

This gives a total of 165 ms.

### <End of Change 3>

### <Start of Change 4 (R4-2113231)>

## A.12.2 RRC\_CONNECTED state mobility

### A.12.2.1 Handover

#### A.12.2.1.1 E-UTRAN - NR with CCA handover

##### A.12.2.1.1.1 Test Purpose and Environment

This test shall verify the E-UTRAN to NR FR1 handover requirements specified in clause 5.3.4A in TS 36.133 [15].

The test comprises of one E-UTRA carrier and one NR carrier with CCA. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN cell and Cell 2 is an inter-RAT NR neighbour cell with CCA.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 of TS 36.133 [15] is configured before T2 begins to enable inter-RAT frequency monitoring. A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.12.2.1.1-1. General test parameters are provided in Table A.12.2.1.1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.12.2.1.1-3 and A.12.2.1.1-4 respectively.

Table A.12.2.1.1-1: Supported test configurations for E-UTRAN inter-RAT NR handover

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR with CCA 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.12.2.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency with CCA is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN cell |
| Neighbouring cell |  | Cell 2 | NR cell with CCA |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.26.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.26.2.2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | -84 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2NR | | dBm | As specified in Table A.12.2.1.1-4 | Absolute NR SS-RSRP threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts [15] |
| T1 | | s | [5] |  |
| T2 | | s | [£5] |  |
| T3 | | s | [1] |  |

Table A.12.2.1.1-3: Cell specific test parameters for E-UTRAN inter-RAT NR handover with CCA (Cell 1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | | |
| T1 | T2 | T3 |
| RF channel number |  | 1, 2 | 2 | | |
| Duplex mode |  | 1 | FDD | | |
|  |  | 2 | TDD | | |
| TDD special subframe configurationNote1 |  | 1, 2 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 1, 2 | 1 | | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | | |
| PRACH ConfigurationNote2 |  | 1 | 4 | | |
| 2 | 53 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | | |
| 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | | |
| 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | | |
| OCNG PatternsNote3 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | | |
| 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | | |
| PBCH\_RA | dB | 1, 2 | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote4 |
| OCNG\_RBNote4 |
| NocNote5 | dBm/15kHz | 1, 2 | -98 | | |
| Ês/Noc | dB | 1, 2 | 7 | 7 | 7 |
| Ês/IotNote6 | dB | 1, 2 | 7 | 7 | 7 |
| RSRPNote6 | dBm/15kHz | 1, 2 | -91 | -91 | -91 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2 | -91 | -91 | -91 |
| IoNote6 | dBm/9MHz | 1, 2 | -62.43 | -62.43 | -62.43 |
| Propagation Condition |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2 | 1x2 Low | | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: 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 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | | |

Table A.12.2.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR with CCA handover (Cell 2)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Configuration | Cell 2 | | |
|  | T1 | T2 | T3 |
| RF channel number | | |  | 1, 2 | 1 | | |
| DL CCA probability PCCA\_DL | | Semi-static channel access Note 4, 6 |  | 1, 2 | PCCA\_DL=0.9375 | | |
|  | | Dynamic channel access Note 5, 6 |  | 1, 2 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | |
| UL CCA probability PCCA\_UL | | Semi-static channel access Note 4, 6 |  | 1, 2 | PCCA\_UL=0.87 | | |
|  | | Dynamic channel access Note 5, 6 |  | 1, 2 | PCCA\_UL=0.75 | | |
| LCCA\_DL | | | - | 1, 2 | 5 | | |
| WCCA\_DL | | | ms | 1, 2 | T304 | | |
| LCCA\_UL | | | - | 1, 2 | 5 | | |
| WCCA\_UL | | | ms | 1, 2 | T304 | | |
| T304 | | | ms | 1, 2 | 500 | | |
| Duplex mode | | |  | 1, 2 | TDD | | |
| TDD Configuration | | |  | 1, 2 | TDDConf.1.1 CCA | | |
| BWchannel | | | MHz | 1, 2 | 40: NRB,c = 106 (TDD) | | |
| PDSCH reference measurement channel | | |  | 1, 2 | SR.1.1 CCA | | |
| CORESET reference channel | | |  | 1, 2 | CR.1.1 CCA | | |
| PRACH configuration | | |  | 1, 2 | FR1 PRACH configuration 1 under CCA | | |
| OCNG patternNote1 | | |  | 1, 2 | OP.1 | | |
| BWP | Initial DL BWP | |  | 1, 2 | DLBWP.0.1 | | |
| Dedicated DL BWP | | DLBWP.1.1 | | |
| Initial UL BWP | | ULBWP.0.1 | | |
| Dedicated UL BWP | | ULBWP.1.1 | | |
| SMTC configuration | | |  | 1, 2 | SMTC.1 | | |
| SSB configuration | | Semi-static channel access Note 4, 6 |  | 1, 2 | SSB.1 CCA | | |
|  | | Dynamic channel access Note 5, 6 |  | 1, 2 | SSB.2 CCA | | |
| DBT window configuration | | |  |  | As defined in A.3.28.1 | | |
| b2-Threshold2NR | | | dBm | 1 | -105 | | |
| 2 | -103 | | |
| 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\_DMRS | | |
| EPRE ratio of OCNG DMRS to SSS | | |
| EPRE ratio of OCNG to OCNG DMRS | | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2 | -98 | | |
| *Noc*Note2 | | | dBm/SCS | 1, 2 | -95 | | |
| Ês/Noc | | | dB | 1, 2 | -inifinit | 0 | 0 |
| Ês/IotNote3 | | | dB | 1, 2 | -inifinit | 0 | 0 |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2 | -inifinit | -95 | -95 |
| IoNote3 | | | dBm/38.16 MHz | 1, 2 | -63.96 | -60.94 | -60.94 |
| Propagation condition | | |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2 | 1x2 Low | | |
| 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: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | |

##### A.12.2.1.1.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than TBD ms from the beginning of time period T3.

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 50 ms and is specified in TS36.331.

Tinterrupt = 62 + ( L1´ + L3) \* TSMTC; Tinterrupt is defined in TS36.133 clause 5.3.4A.3 where

L1´ is the number of SMTC occasions not available at the UE during the inter-RAT detection period.

L3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. L3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [57].

TSMTC = 20 ms is the SMTC periodicity ms in the test.

This gives a total of 112 + (L1´ + L3)\*20 ms.

### <End of Change 4>

### <Start of Change 5 (R4-2114434)>

A.11.2.2.1.3 Intra-frequency RRC Re-establishment with CCA in FR1 without serving cell timing

A.11.2.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay with CCA in FR1 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1A.

The test parameters are given in table A.11.2.2.1.3.1-1, table A.11.2.2.1.3.1-2 and table A.11.2.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell with CCA, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.11.2.2.1.3.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

**Table A.11.2.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial Condition | Active cell | - | Cell1 | Cell 1 is with CCA. |
|  | Neighbour cells | - | Cell2 | Cell 2 is with CCA. |
| Final condition | Active cell | - | Cell2 |  |
| RF Channel Number | | - | 1 |  |
| DL CCA model | Dynamic channel accessNote 1,3 | - | As specified in clause A.3.26.2.1 |  |
|  | Semi-static channel access Note 2,3 | - |  |
| UL CCA model | Dynamic channel access Note 1,3 | - | As specified in clause A.3.26.2.2 |  |
|  | Semi-static channel access Note 2,3 | - |  |
| Time offset between cells | | - | 3 μs | Synchronous cells |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| SSB configuration | Dynamic channel access Note 1, 3 | - | SSB.2 CCA | Table A.3.10A.1.2-1 |
|  | Semi-static channel access Note 2, 3 | - | SSB.1 CCA | Table A.3.10A.1.1-1 |
| DBT window configuration | | - | DBT.1 | Table A.3.28.1-1 |
| SMTC configuration | | - | SMTC pattern 1 |  |
| DRX cycle length | | s | OFF |  |
| PRACH configuration | | - | FR1 PRACH configuration 1 | Table A.3.8A.2.1-1 |
| T1 | | s | 5 |  |
| T2 | | ms | 6 | Time for the UE to detect RLF |
| T3 | | s | 3 |  |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | |

**Table A.11.2.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | | **Cell 2** | | | | |
| **T1** | | **T2** | | **T3** | **T1** | **T2** | | | **T3** |
| TDD configuration |  | TDDConf.1.1 CCA | | | | | TDDConf.1.1 CCA | | | | |
| DL CCA probability PCCA\_DL for dynamic channel access Note 4,6 | - | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | |
| DL CCA probability PCCA\_DL for semi-static channel access Note 5,6 | - | PCCA\_DL=0.9375 | | | | | PCCA\_DL=0.9375 | | | | |
| UL CCA probability PCCA\_UL | - | 1 | | | | | 1 | | | | |
| PDSCH RMC configuration |  | SR.1.1 CCA | | | | | SR.1.1 CCA | | | | |
| RMSI CORESET RMC configuration |  | CR.1.1 CCA | | | | | CR.1.1 CCA | | | | |
| Dedicated CORESET RMC configuration |  | CCR.1.1 CCA | | | | | CCR.1.1 CCA | | | | |
| OCNG Pattern |  | OP.1 defined in A.3.2.1 | | | | | OP.1 defined in A.3.2.1 | | | | |
| TRS configuration |  | TRS.1.2 TDD | | | | | N/A | | | | |
| Initial DL BWP configuration |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration |  | DLBWP.1.1 | N/A | | N/A | | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | ULBWP.1.1 | N/A | | N/A | | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | SSB | | | | | SSB | | | | |
|  | dB | 4 | | -infinity | | -infinity | -infinity | -infinity | | | 4 |
| Note2 | dBm/SCS | -95 | | | | | | | | | |
| Note2 | dBm/15 kHz | -98 | | | | | | | | | |
|  |
|  | dB | 7 | | -infinity | | -infinity | -infinity | -infinity | | | 4 |  |
| SS-RSRP Note3 | dBm/SCS | -91 | | -infinity | | -infinity | -infinity | -infinity | | | -91 |  |
| Io | dBm/38.16 MHz | -58.50 | | -63.94 | | -63.94 | -63.94 | -63.94 | | | -58.50 |  |
| 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.  NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 5: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | | | | |  |

A.11.2.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 1350 + MAX (800 ms, (10+ K1) x 20) ms.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Where,

Nfreq = 1

Tidentify\_intra\_NR = MAX (800 ms, (10+ K1) x TSMTC), where

K1 is the number of SMTC occasions not available at the UE due to DL CCA failures during RRC re-establishment period on the carrier with CCA.

TSMTC is the SMTC periodicity which is 20 ms.

Tidentify\_inter\_NR\_CCA = 0 ms

TSI-NR\_CCA = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

TPRACH\_CCA = (1+ K3)\*TSSB,RO + 10 ms, where:

- TSSB,RO is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39]. It is 10 ms for FR1 PRACH configuration 1 under CCA.

- K3 = 0.

This gives total =1350 + MAX (800 ms, (10+ K1) x 20) ms.

A.11.2.2.1.4 Inter-frequency RRC Re-establishment from NR FR1 carrier without CCA to NR FR1 carrier under CCA

A.11.2.2.1.4.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay requirement for RRC re-establishment from NR FR1 carrier without CCA to NR FR1 inter-frequency carrier under CCA with unknown target cell. These tests will verify the requirements in clause 6.2.1A.

The test parameters are given in table A.11.2.2.1.4.1-1, table A.11.2.2.1.4.1-2 and table A.11.2.2.1.4.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

**Table A.11.2.2.1.4.1-1: Supported test configurations inter-frequency RRC re-establishment from NR FR1 without under CCA to NR FR1 inter-frequency carrier under CCA**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Source cell without CCA** | **Target cell with CCA** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

**Table A.11.2.2.1.4.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case from NR FR1 carrier without CCA to NR FR1 inter-frequency carrier under CCA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** | **Comment** |
| Initial condition | Active cell | |  | Cell1 |  |
| Neighbour cells | |  | Cell2 |  |
| Final condition | Active cell | |  | Cell2 |  |
| RF Channel Number | | |  | 1, 2 |  |
| Time offset between cells | | |  | 3 μs | Synchronous cells |
| DL CCA model | | Dynamic channel accessNote 1,3 | - | As specified in clause A.3.26.2.1 |  |
| Semi-static channel access Note 2,3 | - |  |
| UL CCA model | | Dynamic channel access Note 1,3 | - | As specified in clause A.3.26.2.2 |  |
| Semi-static channel access Note 2,3 | - |  |
| N310 | | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | | ms | 5000 | RRC re-establishment timer |
| Access Barring Information | | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | | s | OFF |  |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | Table A.3.8A.2.1-1 |
| T1 | | | s | 5 |  |
| T2 | | | ms | 480 | Time for the UE to detect RLF |
| T3 | | | s | ≥ TUE\_re-establish\_delay\_CCA | As defined in clause 6.2.1A |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | |

**Table A.11.2.2.1.4.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case from NR FR1 carrier without CCA to NR FR1 inter-frequency carrier under CCA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Test config** | **Unit** | **Cell 1** | | | | | **Cell 2** | | | | |
| **T1** | | **T2** | | **T3** | **T1** | **T2** | | | **T3** |
| TDD configuration | | 1 |  | N/A | | | | | TDDConf.1.1.CCA | | | | |
| 2 |  | TDDConf.1.1 | | | | | TDDConf.1.1.CCA | | | | |
| 3 |  | TDDConf.2.1 | | | | | TDDConf.1.1.CCA | | | | |
| PDSCH RMC configuration | | 1 |  | SR.1.1 FDD | | | | | SR.1.1 CCA | | | | |
| 2 |  | SR.1.1 TDD | | | | | SR.1.1 CCA | | | | |
| 3 |  | SR.2.1 TDD | | | | | SR.1.1 CCA | | | | |
| RMSI CORESET RMC configuration | | 1 |  | CR.1.1 FDD | | | | | CR.1.1 CCA | | | | |
| 2 |  | CR.1.1 TDD | | | | | CR.1.1 CCA | | | | |
| 3 |  | CR.2.1 TDD | | | | | CR.1.1 CCA | | | | |
| Dedicated CORESET RMC configuration | | 1 |  | CCR.1.1 FDD | | | | | CCR.1.1 CCA | | | | |
| 2 |  | CCR.1.1 TDD | | | | | CCR.1.1 CCA | | | | |
| 3 |  | CCR.2.1 TDD | | | | | CCR.1.1 CCA | | | | |
| OCNG Pattern | | 1 |  | OP.1 defined in A.3.2.1 | | | | | OP.1 defined in A.3.2.1 | | | | |
| TRS configuration | | 1 |  | TRS.1.1 FDD | | | | | TRS.1.2 TDD | | | | |
| 2 |  | TRS.1.1 TDD | | | | | TRS.1.2 TDD | | | | |
| 3 |  | TRS.1.2 TDD | | | | | TRS.1.2 TDD | | | | |
| SMTC configuration | | 1,2,3 |  | SMTC.1 | | | | | SMTC.1 | | | | |
| SSB configuration | Semi- static channel acces | 1,2 |  | SSB.1 FR1 | | | | | SSB.1 CCA | | | | |
| Semi- static channel acces | 3 |  | SSB.2 FR1 | | | | | SSB.1 CCA | | | | |
| Dymamic channel acces | 1,2 |  | SSB.1 FR1 | | | | | SSB.2 CCA | | | | |
| Dymamic channel acces | 3 |  | SSB.2 FR1 | | | | | SSB.2 CCA | | | | |
| Initial DL BWP configuration | | 1,2,3 |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration | | 1,2,3 |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration | | 1,2,3 |  | DLBWP.1.1 | N/A | | N/A | | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration | | 1,2,3 |  | ULBWP.1.1 | N/A | | N/A | | N/A | | N/A | ULBWP.1.1 | |
| DL CCA probability for semi-static channel access (PCCA\_DL) | | 1,2,3 |  | N/A | N/A | | N/A | | 1 | | 1 | 0.9375 | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_1) | | 1,2,3 |  | N/A | N/A | | N/A | | 1 | | 1 | 0.75 | |
| DL CCA probability for for dynamic static channel access (PCCA\_DL\_2) | | 1,2,3 |  | N/A | N/A | | N/A | | 1 | | 1 | 0.75 | |
| UL CCA probability (PCCA\_UL) | | 1,2,3 |  | N/A | N/A | | N/A | | 1 | | 1 | 1 | |
| RLM-RS | | 1,2,3 |  | SSB | | | | | SSB | | | | |
|  | | 1,2,3 | dB | 4 | | -infinity | | -infinity | -infinity | -infinity | | | 7 |
| Note2 | | 1,2,3 | dBm/15 KHz | -98 | | | | | | | | | |
| Note2 | | 1,2 | dBm/SCS | -98 | | | | | | | | | |
| 3 |  | -95 | | | | | | | | | |
|  | | 1,2,3 | dB | 4 | | -infinity | | -infinity | -infinity | -infinity | | | 7 |
| SS-RSRP Note3 | | 1, 2 | dBm/SCS | -94 | | -infinity | | -infinity | -infinity | -infinity | | | -91 |
|  | | 3 | -91 | | -infinity | | -infinity | -infinity | -infinity | | | -88 |
| Io | | 1,2 | dBm/9.36 MHz | -64.59 | | -70. 05 | | -70. 05 | -70. 05 | -70.05 | | | -62.26 |
| 3 | dBm/38.16 MHz | -58.50 | | -63.94 | | -63.94 | -63.94 | -63.94 | | | -56.15 |
| Propagation Condition | | 1,2,3 |  | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause A.3.20.2.  Note 5:      For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | | | | | |

A.11.2.2.1.4.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less .

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Nfreq = 2

Tidentify\_intra\_NR\_CCA = MAX (800 ms, (10+ K1) x 20) ms

Tidentify\_inter\_NR\_CCA = MAX (800 ms, ([13]+K2,2) x 20) ms

TSI = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

TPRACH\_CCA = It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. TPRACH\_CCA = (1+ K3)\*TSSB,RO + 10 ms; where K3=0 and TSSB,RO=10 ms for FR1 PRACH configuration 1 under CCA.

K1 is the number of SMTC occasions not available at the UE due during RRC re-establishment period on the carrier with CCA and with RF channel number # 1.

K2,2 is the number of SMTC occasions not available at the UE during RRC re-establishment period on the carrier with CCA and with RF channel number # 2.

This gives total =1350+MAX (800 ms, (10+ K1) x 20) ms+MAX (800 ms, ([13]+K2,2) x 20) ms.

### <End of Change 5>

### <Start of Change 6 (R4-2113233)>

A.11.2.2 RRC connection mobility control

A.11.2.2.1 RRC re-establishment

A.11.2.2.1.1 Intra-frequency RRC Re-establishment with CCA in FR1

A.11.2.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay with CCA in FR1 with known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1A.

The test parameters are given in table A.11.2.2.1.1.1-1, table A.11.2.2.1.1.1-2 and table A.11.2.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell with CCA, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.11.2.2.1.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

**Table A.11.2.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case with CCA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial Condition | Active cell | - | Cell1 | Cell 1 is with CCA. |
|  | Neighbour cells | - | Cell2 | Cell 2 is with CCA. |
| Final condition | Active cell | - | Cell2 |  |
| RF Channel Number | | - | 1 |  |
| DL CCA model | Dynamic channel accessNote 1, 3 | - | As specified in clause A.3.26.2.1 |  |
|  | Semi-static channel access Note 2, 3 | - |  |  |
| UL CCA model | Dynamic channel access Note 1, 3 | - | As specified in clause A.3.26.2.2 |  |
|  | Semi-static channel access Note 2,3 | - |  |  |
| Time offset between cells | | - | 3 ms | Synchronous cells |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| SSB configuration | Dynamic channel access Note 1, 3 | - | SSB.2 CCA | Table A.3.10A.1.2-1 |
|  | Semi-static channel access Note 2, 3 | - | SSB.1 CCA | Table A.3.10A.1.1-1 |
| DBT window configuration | | - | DBT.1 | Table A.3.28.1-1 |
| SMTC configuration | | - | SMTC pattern 1 |  |
| DRX cycle length | | s | OFF |  |
| PRACH configuration | | - | FR1 PRACH configuration 1 under CCA | Table A.3.8A.2.1-1 |
| T1 | | s | 5 |  |
| T2 | | ms | 480 | Time for the UE to detect RLF |
| T3 | | s | 2 |  |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | |

**Table A.11.2.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case with CCA**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | | **Cell 2** | | | | |
| **T1** | | **T2** | | **T3** | **T1** | **T2** | | | **T3** |
| TDD configuration | - | TDDConf.1.1 CCA | | | | | TDDConf.1.1 CCA | | | | |
| DL CCA probability PCCA\_DL for dynamic channel access Note 4,6 | - | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | |
| DL CCA probability PCCA\_DL for semi-static channel access Note 5,6 | - | PCCA\_DL=0.9375 | | | | | PCCA\_DL=0.9375 | | | | |
| UL CCA probability PCCA\_UL | - | 1 | | | | | 1 | | | | |
| PDSCH RMC configuration |  | SR.1.1 CCA | | | | | SR.1.1 CCA | | | | |
| RMSI CORESET RMC configuration |  | CR.1.1 CCA | | | | | CR.1.1 CCA | | | | |
| Dedicated CORESET RMC configuration |  | CCR.1.1 CCA | | | | | CCR.1.1 CCA | | | | |
| OCNG Pattern |  | OP.1 defined in A.3.2.1 | | | | | OP.1 defined in A.3.2.1 | | | | |
| TRS configuration |  | TRS.1.2 TDD | | | | | N/A | | | | |
| Initial DL BWP configuration |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration |  | DLBWP.1.1 | N/A | | N/A | | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | ULBWP.1.1 | N/A | | N/A | | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | SSB | | | | | SSB | | | | |
|  | dB | 1.54 | | -infinity | | -infinity | -3.79 | 4 | | | 4 |
| Note2 | dBm/SCS | -95 | | | | | | | | | |
| Note2 | dBm/15 kHz | -98 | | | | | | | | | |
|  | dB | 7 | | -infinity | | -infinity | 4 | 4 | | | 4 |
| SS-RSRP Note3 | dBm/SCS | -88 | | -infinity | | -infinity | -91 | -91 | | | -91 |
| Io | dBm/38.16 MHz | -54.65 | | -58.50 | | -58.50 | -54.65 | -58.50 | | | -58.50 |
| 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.  NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 5: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | | | | |

A.11.2.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known NR intra frequency cell with CCA shall be less than 1350 + MAX (200, (5+K1) x 20) ms.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Where:

TUL\_grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence TUL\_grant is not used.

Where

Nfreq = 1

Tidentify\_intra\_NR\_CCA = MAX (200 ms, (5+K1) x TSMTC), where

K1 is the number of SMTC occasions not available at the UE due to DL CCA failures during RRC re-establishment period on the carrier with CCA.

TSMTC = 20 ms is the SMTC periodicity.

Tidentify\_inter\_NR\_CCA = 0 ms

TSI-NR\_CCA = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

TPRACH\_CCA = TSSB,RO + 10 ms, where:

- TSSB,RO is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39], which is TSSB,RO=10 ms for FR1 PRACH configuration 1 under CCA.

This gives a total of 1350 + MAX (200, (5+K1) x 20) ms.

A.11.2.2.1.2 Inter-frequency RRC Re-establishment with CCA in FR1

A.11.2.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay with CCA in FR1 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1A.

### <End of Change 6>

### <Start of Change 7 (R4-2114436)>

A.11.2.2.3.2 Redirection from NR FR1 carrier without CCA to NR FR1 carrier with CCA

A.11.2.2.3.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR FR1 carrier without CCA to NR FR1 carrier with CCA specified in clause 6.2.3.2.3.

A.11.2.2.3.2.2 Test Parameters

Supported test configurations are shown in table A.11.2.2.3.2.2-1. The time delay is tested by using the parameters in table A.11.2.2.3.2.2-2, and A.11.2.2.3.2.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

**Table A.11.2.2.3.2.2-1: Redirection from NR to NR test configurations**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Source cell without CCA** | **Target cell with CCA** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD | 30 kHz SSB SCS, 40 MHz bandwidth, TDD |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

**Table A.11.2.2.3.2.2-2: General test parameters for Redirection from NR to NR test case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | On the carrier without CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| DL CCA model | Dynamic channel accessNote 1, 3 |  | As specified in clause A.3.26.2.1 |  |
| Semi-static channel access Note 2, 3 |
| UL CCA model | Dynamic channel access Note 1, 3 |  | As specified in clause A.3.26.2.2 |  |
| Semi-static channel access Note 2,3 |
| T1 | | s | 5 |  |
| T2 | | s | ≥ Tconnection\_release\_redirect\_NR\_CCA | Tconnection\_release\_redirect\_NR\_CCA ­is defined in clause 6.2.3.2.3 |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic  channel occupancy only. | | | | |

**Table A.11.2.2.3.2.2-3: Cell specific test parameters for Redirection from NR to NR test case**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** | | **Cell 2** | | |
|  | | |  | **T1** | **T2** | **T1** | | **T2** |
| NR RF Channel Number | | |  | 1 | | 2 | | |
| PCCA\_DL for dynamic channel access Note 4,6 | | |  | N/A | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | |
| PCCA\_DL for semi-static channel access Note 5,6 | | |  | N/A | | PCCA\_DL=0.9375 | PCCA\_DL=0.9375 | |
| PCCA\_UL for dynamic channel access Note 4,6 | | |  | N/A | | 1 | 1 | |
| PCCA\_UL for semi-static channel access Note 5,6 | | |  | N/A | | 1 | 1 | |
| LCCA\_DL Note 7 | | |  | N/A | | 8 | | |
| WCCA\_DL Note 7 | | | ms | N/A | | Tidentify-NR\_CCA | | |
| Duplex mode | | Config 1 |  | FDD | | TDD | | |
|  | | Config 2,3 |  | TDD | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | TDDConf.1.1 CCA | | |
|  | | Config 2 |  | TDDConf.1.1 | | TDDConf.1.1 CCA | | |
|  | | Config 3 |  | TDDConf.2.1 | | TDDConf.1.1 CCA | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | SR.1.1 CCA | | |
| Config 2 |  | SR.1.1 TDD | | SR.1.1 CCA | | |
| Config 3 |  | SR2.1 TDD | | SR.1.1 CCA | | |
| RMSI CORESET RMC configuration | | Config 1 |  | CR.1.1 FDD | | CR.1.1 CCA | | |
| Config 2 |  | CR.1.1 TDD | | CR.1.1 CCA | | |
| Config 3 |  | CR2.1 TDD | | CR.1.1 CCA | | |
| Dedicated CORESET RMC configuration | | Config 1 |  | CCR.1.1 FDD | | CCR.1.1 CCA | | |
| Config 2 | CCR.1.1 TDD | | CCR.1.1 CCA | | |
| Config 3 | CCR.2.1 TDD | | CCR.1.1 CCA | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | |
| SSB Configuration | Semi-static channel acces | Config 1,2 |  | SSB.1 FR1 | | SSB.1 CCA | | |
| Dymamic channel acces | Config 3 |  | SSB.2 FR1 | | SSB.2 CCA | | |
| Semi-static channel acces | Config 1,2 |  | SSB.1 FR1 | | SSB.1 CCA | | |
| Dymamic channel acces | Config 3 |  | SSB.2 FR1 | | SSB.2 CCA | | |
| SMTC configuration | | Config 1,2 |  | SMTC.1 FR1 | | SMTC.2 FR1 | | |
|  | | Config 3 |  | SMTC.2 FR1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | 30 kHz | | |
| Config 3 |  | 30 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | 30 kHz | | |
| Config 3 |  | 30 kHz | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 under CCA in Table A.3.8A.2.1-1 | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | |
|  | | Dedicated UL BWP |  | ULBWP.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) | | |
| Note2 | | | dBm/15kHz | -98 | | | | |
| Note2 | | Config 1,2 | dBm/SCS | -98 | | -95 | | |
| Config 3 |  | -95 | | | | |
|  | | | dB | 4 | 4 | -infinity | | 4 |
|  | | | dB | 4 | 4 | -infinity | | 4 |
| IoNote3 | | Config 1,2 | dBm/9.36MHz | -64.59 | -64.59 | N/A | | N/A |
| Config 3 | dBm/38.16MHz | -58.49 | -58.49 | -63.94 | | -58.49 |
| 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.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.  Note 7: As defined in clause 6.2.3.2.3 for Trs ≤ 40 ms. | | | | | | | | |

A.11.2.2.3.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than Tconnection\_release\_redirect\_NR\_CCA ms from the beginning of time period T2, where Tconnection\_release\_redirect\_NR\_CCA is defined in clause 6.2.3.2.3.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR\_CCA = TRRC\_procedure\_delay + Tidentify-NR\_CCA + TSI-NR\_CCA + TRACH\_CCA,

where:

TRRC\_procedure\_delay = 110 ms in the test.

Tidentify-NR\_CCA = MAX (680 ms, (L1+11) × 20 ms) in the test.

TSI-NR\_CCA = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

TRACH\_CCA is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. TRACH\_CCA = (1+L2)×TSSB,RO + 10 ms; where TSSB,RO = 10 ms for FR1 PRACH configuration 1.

L1 is the number of SMTC occasions not available at the UE due to DL CCA failures. The test equipment shall ensure that L1 does not exceed L1,max. In the test L1,max= LCCA\_DL which is defined in clause A.3.26.2.1.

L2 is the consecutive number of SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failures. L2 = 0 in the test.

The total delay, Tconnection\_release\_redirect\_NR\_CCA, shall be less than 1410 + MAX (680, (L1+11)×20) ms.

### <End of Change 7>

### <Start of Change 8 (R4-2114112)>

#### A.11.2.2.3 RRC connection release with redirection

##### A.11.2.2.3.1 Redirection from NR FR1 carrier under CCA to NR FR1 carrier under CCA

A.11.2.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR FR1 carrier under CCA to NR FR1 carrier under CCA specified in clause 6.2.3.2.3.

A.11.2.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.11.2.2.3.1.2-1. The time delay is tested by using the parameters in table A.11.2.2.3.1.2-2, and A.11.2.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.11.2.2.3.1.2-1: Redirection from NR to NR test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.2.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
| Initial conditions | Active cell | |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell | |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell | |  | Cell 2 | On the carrier under CCA |
| Filter coefficient | | |  | 0 | L3 filtering is not used |
| Access Barring Information | | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | | |  | 3 μs | Synchronous cells |
| DL CCA model | | Dynamic channel accessNote 1, 3 |  | As specified in clause A.3.26.2.1 |  |
| Semi-static channel access Note 2, 3 |
| UL CCA model | | Dynamic channel access Note 1, 3 |  | As specified in clause A.3.26.2.2 |  |
| Semi-static channel access Note 2,3 |
| T1 | | | s | 5 |  |
| T2 | | | s | ≥ Tconnection\_release\_redirect\_NR\_CCA | Tconnection\_release\_redirect\_NR\_CCA ­is defined in clause 6.2.3.2.3 |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic  channel occupancy only. | | | | | |

Table A.11.2.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| PCCA\_DL for dynamic channel access Note 4,6 | | | - | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | |
| PCCA\_DL for semi-static channel access Note 5,6 | | | - | PCCA\_DL=0.9375 | | | | PCCA\_DL=0.9375 | | |
| PCCA\_UL for dynamic channel access Note 4,6 | | | - | 1 | | | | 1 | | |
| PCCA\_UL for semi-static channel access Note 5,6 | | | - | 1 | | | | 1 | | |
| LCCA\_DL Note 7 | | |  | N/A | | | | 8 | | |
| WCCA\_DL Note 7 | | | ms | N/A | | | | Tidentify-NR\_CCA | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | |
| BWchannel | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference | | Config 1 |  | SR.1.1 CCA | | | | | | |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | | | | | | |
| Dedicated CORESET RMC configuration | | Config 1 |  | CCR.1.1 CCA | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | |
| DBT configuration | | |  | DBT.1 | | | | | | |
| SSB configuration for semi-static channel access Note 4, 6 | | Config 1 |  | SSB.1 CCA | | | | | | |
| SSB configuration for dynamic channel access Note 5, 6 | | Config 1 |  | SSB.2 CCA | | | | | | |
| ssb-PositionQCL | | Config 1 |  | [1] | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 under CCA | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.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) | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | |
| Note2 | Config 1 | | dBm/SCS | -95 | | | | | | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
| IoNote3 | Config 1 | | dBm/  38.16MHz | -58.49 | -58.49 | | -63.94 | | -58.49 | |
| 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  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.  Note 7: As defined in clause 6.2.3.2.3 for Trs ≤ 40 ms. | | | | | | | | | | |

A.11.2.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than Tconnection\_release\_redirect\_NR\_CCA ms from the beginning of time period T2, where Tconnection\_release\_redirect\_NR\_CCA is defined in clause 6.2.3.2.3.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

Tconnection\_release\_redirect\_NR\_CCA = TRRC\_procedure\_delay + Tidentify-NR\_CCA + TSI-NR\_CCA + TRACH\_CCA,

where:

TRRC\_procedure\_delay = 110 ms in the test.

Tidentify-NR\_CCA = MAX (680 ms, (L1+11) × 20 ms) in the test.

TSI-NR = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

TRACH\_CCA is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell.

L1 is the number of SMTC occasions not available at the UE due to DL CCA failures. The test equipment ensure that number of L1 in target cell does not exceed L1,max using the configured LCCA\_DL as in clause A.3.26.2.1;

### <End of Change 8>

### <Start of Change 9 (R4-2113469)>

 A.10.1.1.1 Random Access

A.10.1.1.1.1 4-step RA type contention-based random access for NR PSCell with CCA

A.10.1.1.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in clause 6.2.2A.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7A.2.1 and Cell 2 configured as PSCell in FR1. Cell 1 is on a licensed band and cell 2 is subjected to CCA. Supported test parameters are shown in Table A.10.1.1.1.1.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.10.1.1.1.1.1-2.

**Table A.10.1.1.1.1.1-1: Supported test configurations for contention based random access test in FR1 for PSCell with CCA**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | 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 depending on UE capability | |

**Table A.10.1.1.1.1.1-2: General test parameters for contention based random access test in FR1 for PSCell with CCA**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Note 4, 6 | | | Config 1,2 |  | SSB.1 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1,2 |  | SSB.2 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1,2 |  | DBT.1 | As specified in A.3.28.1 |
| DL CCA model | | | | Config 1,2 |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | Config 1,2 |  | As specified in A.3.26.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1,2 |  | TDD |  |
| TDD Configuration | | | | Config 1,2 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | | | Config 1,2 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1,2 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | | | |  | FR1 PRACH configuration 1 under CCA | As defined in A.3.8A.2. |
| DL CCA probability | | | Note 4, 6 | |  | 0.9375 |  |
| PCCA\_DL | | | Note 5, 6 | |  | 0.75 / 0.75 |  |
| LCCA\_DL Note 7 | | | | |  | 4 |  |
| WCCA\_DL Note 8 | | | | |  | Inf |  |
| UL CCA probability | | | Note 4, 6 | |  | 0.87 |  |
| PCCA\_UL | | | Note 5, 6 | |  | 0.75 |  |
| LCCA\_UL Note 7 | | | | |  | 5 |  |
| WCCA\_UL Note 8 | | | | |  | Inf |  |
| Semi-static channel access config period Note 4, 6 | | | | | ms | 2 |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.  Note 7: LCCA\_DL and LCCA\_UL are chosen such that preambleTransMax > 5 + LCCA\_DL + LCCA\_UL.  Note 8: A window WCCA\_DL=WCCA\_UL=Inf is used to indicate that LCCA\_DL and LCCA\_UL are considered during the entire duration of a test run. | | | | | | | |

A.10.1.1.1.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.10.1.1.1.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2A.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*, if the UL CCA is successful.

The three requirements below are relevant for all cases of PRACH transmissions described within the whole clause A.10.1.1.1.1.2:

The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.

In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 transmission is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2A.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2A.2.1.4, the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.10.1.1.1.1.2.5 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2A.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.10.1.1.1.2 4-step RA type non-contention based random access for NR PSCell with CCA

A.10.1.1.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in clause 6.2.2A.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7A.2.1 and Cell 2 configured as PSCell in FR1. Cell 1 is on a licensed band and cell 2 is subjected to CCA. Supported test parameters are shown in Table A.10.1.1.1.2.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.10.1.1.1.2.1-2.

**Table A.10.1.1.1.2.1-1: Supported test configurations for non-contention based random access test in FR1 for PSCell with CCA**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | 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 depending on UE capability | |

**Table A.10.1.1.1.2.1-2: General test parameters for non-contention based random access test in FR1 for PSCell with CCA**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Note 4, 6 | | | Config 1,2 |  | SSB.1 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1,2 |  | SSB.2 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1,2 |  | DBT.1 | As specified in A.3.28.1 |
| DL CCA model | | | | Config 1,2 |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | Config 1,2 |  | As specified in A.3.26.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1,2 |  | TDD |  |
| TDD Configuration | | | | Config 1,2 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | | | Config 1,2 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1,2 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | | | |  | FR1 PRACH configuration 2 under CCA | As defined in A.3.8A.2. |
| DL CCA probability | | | Note 4, 6 | |  | 0.9375 |  |
| PCCA\_DL | | | Note 5, 6 | |  | 0.75 / 0.75 |  |
| LCCA\_DL Note 7 | | | | |  | 4 |  |
| WCCA\_DL Note 8 | | | | |  | Inf |  |
| UL CCA probability | | | Note 4, 6 | |  | 0.87 |  |
| PCCA\_UL | | | Note 5, 6 | |  | 0.75 |  |
| LCCA\_UL Note 7 | | | | |  | 5 |  |
| WCCA\_UL Note 8 | | | | |  | Inf |  |
| Semi-static channel access config period Note 4, 6 | | | | | ms | 2 |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.  Note 7: LCCA\_DL and LCCA\_UL are chosen such that preambleTransMax > 5 + LCCA\_DL + LCCA\_UL.  Note 8: A window WCCA\_DL=WCCA\_UL=Inf is used to indicate that LCCA\_DL and LCCA\_UL are considered during the entire duration of a test run. | | | | | | | |

A.10.1.1.1.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.10.1.1.1.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2A.2.2.1 for SSB-based Random Access Preamble transmission, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

The three requirements below are relevant for all cases of PRACH transmissions described within the whole clause A.10.1.1.1.2.2:

The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.

In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.2.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.2.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2A.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.3 2-step RA type contention-based random access for NR PSCell with CCA

A.10.1.1.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behaviour of the random access procedure is according to the requirements and that the MsgA PRACH, MsgA PUSCH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in clause 6.2.2A.3 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7A.2.1 and Cell 2 configured as PSCell in FR1. Cell 1 is on a licensed band and cell 2 is subjected to CCA. Supported test parameters are shown in Table A.10.1.1.1.3.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.10.1.1.1.3.1-2.

**Table A.10.1.1.1.3.1-1: Supported test configurations for 2-step RA type contention based random access test in FR1 for PSCell with CCA**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | 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 depending on UE capability | |

**Table A.10.1.1.1.3.1-2: General test parameters for 2-step RA type contention based random access test in FR1 for PSCell with CCA**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Note 4, 6 | | | Config 1,2 |  | SSB.1 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1,2 |  | SSB.2 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1,2 |  | DBT.1 | As specified in A.3.28.1 |
| DL CCA model | | | | Config 1,2 |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | Config 1,2 |  | As specified in A.3.26.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1,2 |  | TDD |  |
| TDD Configuration | | | | Config 3,4 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 ­ | | | | Config 1,2 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP Note 2 | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP Note 2 | | | dBm/ SCS | -115 |  |
| Io | | | | Config 1,2 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | | | |  | FR1 MsgA configuration 1 under CCA | As defined in A.3.20A.2. |
| *msgA-RSRP-ThresholdSSB* | | | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| DL CCA probability | | | Note 4, 6 | |  | 0.9375 |  |
| PCCA\_DL | | | Note 5, 6 | |  | 0.75 / 0.75 |  |
| LCCA\_DL Note 7 | | | | |  | 4 |  |
| WCCA\_DL Note 8 | | | | |  | Inf |  |
| UL CCA probability | | | Note 4, 6 | |  | 0.87 |  |
| PCCA\_UL | | | Note 5, 6 | |  | 0.75 |  |
| LCCA\_UL Note 7 | | | | |  | 5 |  |
| WCCA\_UL Note 8 | | | | |  | Inf |  |
| Semi-static channel access config period Note 4, 6 | | | | | ms | 2 |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.  Note 7: LCCA\_DL and LCCA\_UL are chosen such that preambleTransMax > 5 + LCCA\_DL + LCCA\_UL.  Note 8: A window WCCA\_DL=WCCA\_UL=Inf is used to indicate that LCCA\_DL and LCCA\_UL are considered during the entire duration of a test run. | | | | | | | |

A.10.1.1.1.3.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.10.1.1.1.3.2.1 MsgA Transmission

To test the UE behaviour specified in Clause 6.2.2A.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*, if the UL CCA is successful.

below are relevant for all cases of MsgA transmissions described within the clause A.10.1.1.1.3.2:

The System Simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure. In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.3.2.2 MsgB Reception

To test the UE behaviour specified in Clause 6.2.2A.3.1.2 the System Simulator shall transmit a MsgB with fallbackRAR containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB’s contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble .

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.3.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2A.3.1.3 the System Simulator shall transmit a MsgB with fallbackRAR containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.4 2-step RA type non-contention based random access for NR PSCell with CCA

A.10.1.1.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in clause 6.2.2A.3 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Cell 1 is on a licensed band and cell 2 is subjected to CCA. Supported test parameters are shown in Table A.10.1.1.1.4.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.10.1.1.1.4.1-2.

**Table A.10.1.1.1.4.1-1: Supported test configurations for non-contention based random access test for 2-step RA type in FR1 for PSCell with CCA**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | 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 depending on UE capability | |

**Table A.10.1.1.1.4.1-2: General test parameters for non-contention based random access test for 2-step RA type in FR1 for PSCell with CCA**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Note 4, 6 | | | Config 1,2 |  | SSB.1 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1,2 |  | SSB.2 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1,2 |  | DBT.1 | As specified in A.3.28.1 |
| DL CCA model | | | | Config 1,2 |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | Config 1,2 |  | As specified in A.3.26.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1,2 |  | TDD |  |
| TDD Configuration | | | | Config 1,2 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | | | Config 1,2 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1,2 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power (PCMAX,f,c) | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | | | |  | FR1 MsgA configuration 2 under CCA | As defined in A.3.20A.2. |
| *msgA-RSRP-ThresholdSSB* | | | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| DL CCA probability | | | Note 4, 6 | |  | 0.9375 |  |
| PCCA\_DL | | | Note 5, 6 | |  | 0.75 / 0.75 |  |
| LCCA\_DL Note 7 | | | | |  | 4 |  |
| WCCA\_DL Note 8 | | | | |  | Inf |  |
| UL CCA probability | | | Note 4, 6 | |  | 0.87 |  |
| PCCA\_UL | | | Note 5, 6 | |  | 0.75 |  |
| LCCA\_UL Note 7 | | | | |  | 5 |  |
| WCCA\_UL Note 8 | | | | |  | Inf |  |
| Semi-static channel access config period Note 4, 6 | | | | | ms | 2 |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.  Note 7: LCCA\_DL and LCCA\_UL are chosen such that preambleTransMax > 5 + LCCA\_DL + LCCA\_UL.  Note 8: A window WCCA\_DL=WCCA\_UL=Inf is used to indicate that LCCA\_DL and LCCA\_UL are considered during the entire duration of a test run. | | | | | | | |

A.10.1.1.1.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.10.1.1.1.4.2.1 MsgA Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2A.3.2.1 for MsgA transmission, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

The three requirements below are relevant for all cases of MsgA transmissions described within the clause A.10.1.1.1.4.2:

The System Simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.4.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2A.3.2.2 the System Simulator shall transmit a MsgB containing a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble after 5 MsgA transmissions have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE may stop monitoring for MsgB if the MsgB contains a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power if Random Access Responses Reception has not been considered as successful.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.4.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2A.3.2.3 the System Simulator shall transmit a MsgB corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window configured in *RACH-ConfigGenericTwoStepRA*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

 A.11.2.2.2 Random Access

A.11.2.2.2.1 4-step RA type contention-based random access for NR PCell with CCA

A.11.2.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in Clause 6.2.2A.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1, which operates on a carrier frequency with CCA. Supported test parameters are shown in Table A.11.2.2.2.1.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.11.2.2.2.1.1-2.

**Table A.11.2.2.2.1.1-1: Supported test configurations for contention based random access test for FR1 PCell with CCA**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: Void | |

**Table A.11.2.2.2.1.1-2: General test parameters for contention based random access test for FR1 PCell with CCA**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Note 4, 6 | | | Config 1 |  | SSB.3 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1 |  | SSB.4 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1 |  | DBT.1 | As specified in A.3.28.1 |
| DL CCA model | | | | Config 1 |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | Config 1 |  | As specified in A.3.26.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1 |  | TDD |  |
| TDD Configuration | | | | Config 1 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | | | Config 1 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power (PCMAX,f,c) | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | | | |  | FR1 PRACH configuration 1 under CCA | As defined in A.3.8A.2. |
| DL CCA probability | | | Note 4, 6 | |  | 0.9375 |  |
| PCCA\_DL | | | Note 5, 6 | |  | 0.75 / 0.75 |  |
| LCCA\_DL Note 7 | | | | |  | 4 |  |
| WCCA\_DL Note 8 | | | | |  | Inf |  |
| UL CCA probability | | | Note 4, 6 | |  | 0.87 |  |
| PCCA\_UL | | | Note 5, 6 | |  | 0.75 |  |
| LCCA\_UL Note 7 | | | | |  | 5 |  |
| WCCA\_UL Note 8 | | | | |  | Inf |  |
| Semi-static channel access config period Note 4, 6 | | | | | ms | 2 |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.  Note 7: LCCA\_DL and LCCA\_UL are chosen such that preambleTransMax > 5 + LCCA\_DL + LCCA\_UL.  Note 8: A window WCCA\_DL=WCCA\_UL=Inf is used to indicate that LCCA\_DL and LCCA\_UL are considered during the entire duration of a test run. | | | | | | | |

A.11.2.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.11.2.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2A.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*, if the UL CCA is successful.

The three requirements below are relevant for all cases of PRACH transmissions described within the whole clause A.11.2.2.2.1.2:

The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.

In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 transmission is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2A.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2A.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.11.2.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2A.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.11.2.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2A.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.11.2.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2A.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.11.2.2.2.2 4-step RA type non-contention based random access for NR PSCell with CCA

A.11.2.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in Clause 6.2.2A.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1, which operates on a carrier frequency with CCA. Supported test parameters are shown in Table A.11.2.2.2.2.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.11.2.2.2.2.1-2.

**Table A.11.2.2.2.2.1-1: Supported test configurations for non-contention based random access test for FR1 PCell with CCA**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: Void. | |

**Table A.11.2.2.2.2.1-2: General test parameters for non-contention based random access test for FR1 PCell with CCA**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Note 4, 6 | | | Config 1 |  | SSB.3 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1 |  | SSB.4 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1 |  | DBT.1 | As specified in A.3.28.1 |
| DL CCA model | | | | Config 1 |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | Config 1 |  | As specified in A.3.26.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1 |  | TDD |  |
| TDD Configuration | | | | Config 1 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | | | Config 1 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | | | |  | FR1 PRACH configuration 2 under CCA | As defined in A.3.8A.2. |
| DL CCA probability | | | Note 4, 6 | |  | 0.9375 |  |
| PCCA\_DL | | | Note 5, 6 | |  | 0.75 / 0.75 |  |
| LCCA\_DL Note 7 | | | | |  | 4 |  |
| WCCA\_DL Note 8 | | | | |  | Inf |  |
| UL CCA probability | | | Note 4, 6 | |  | 0.87 |  |
| PCCA\_UL | | | Note 5, 6 | |  | 0.75 |  |
| LCCA\_UL Note 7 | | | | |  | 5 |  |
| WCCA\_UL Note 8 | | | | |  | Inf |  |
| Semi-static channel access config period Note 4, 6 | | | | | ms | 2 |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.  Note 7: LCCA\_DL and LCCA\_UL are chosen such that preambleTransMax > 5 + LCCA\_DL + LCCA\_UL.  Note 8: A window WCCA\_DL=WCCA\_UL=Inf is used to indicate that LCCA\_DL and LCCA\_UL are considered during the entire duration of a test run. | | | | | | | |

A.11.2.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.11.2.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2A.2.2.1 for SSB-based Random Access Preamble transmission, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

The three requirements below are relevant for all cases of PRACH transmissions described within the clause A.11.2.2.2.2.2:

The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.

In case of UL CCA failure The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.2.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.2.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2A.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.3 2-step RA type contention-based random access for NR PCell with CCA

A.11.2.2.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in Clause 6.2.2A.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1, which operates on a carrier frequency with CCA. Supported test parameters are shown in Table A.11.2.2.2.3.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.11.2.2.2.3.1-2.

**Table A.11.2.2.2.3.1-1: Supported test configurations for 2-step RA type contention based random access with successRAR test for FR1 PCell with CCA**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: Void. | |

**Table A.11.2.2.2.3.1-2: General test parameters for 2-step RA type contention based random access with successRAR test for FR1 PCell with CCA**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Note 4, 6 | | | Config 1 |  | SSB.3 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1 |  | SSB.4 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1 |  | DBT.1 | As specified in A.3.28.1 |
| DL CCA model | | | | Config 1 |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | Config 1 |  | As specified in A.3.26.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1 |  | TDD |  |
| TDD Configuration | | | | Config 2 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | | | Config 1 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |
|  | |  | | | dB | 3 |
|  | | SS-RSRP | | | dBm/ SCS | -95 |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |
|  | |  | | | dB | -17 |
|  | | SS-RSRP | | | dBm/ SCS | -115 |
| Io Note 2 | | | | Config 1 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power (PCMAX,f,c) | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | | | |  | FR1 MsgA configuration 1 under CCA | As defined in A.3.20A.2. |
| *msgA-RSRP-ThresholdSSB* | | | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| DL CCA probability | | | Note 4, 6 | |  | 0.9375 |  |
| PCCA\_DL | | | Note 5, 6 | |  | 0.75 / 0.75 |  |
| LCCA\_DL Note 7 | | | | |  | 4 |  |
| WCCA\_DL Note 8 | | | | |  | Inf |  |
| UL CCA probability | | | Note 4, 6 | |  | 0.87 |  |
| PCCA\_UL | | | Note 5, 6 | |  | 0.75 |  |
| LCCA\_UL Note 7 | | | | |  | 5 |  |
| WCCA\_UL Note 8 | | | | |  | Inf |  |
| Semi-static channel access config period Note 4, 6 | | | | | ms | 2 |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.  Note 7: LCCA\_DL and LCCA\_UL are chosen such that preambleTransMax > 5 + LCCA\_DL + LCCA\_UL.  Note 8: A window WCCA\_DL=WCCA\_UL=Inf is used to indicate that LCCA\_DL and LCCA\_UL are considered during the entire duration of a test run. | | | | | | | |

A.11.2.2.2.3.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.11.2.2.2.3.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2A.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*, if the UL CCA is successful.

The three requirements below are relevant for all cases of MsgA transmissions described within the clause A.11.2.2.2.3.2:

The System Simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble transmission shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.3.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2A.3.1.2 the System Simulator shall transmit a MsgB containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE may stop monitoring for MsgB(s) and shall transmit an ACK if the MsgB with a successRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble and if the Contention Resolution is successful and if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting ACK in the case of CCA UL failure. If ACK transmission is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB(s) contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.3.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2A.3.1.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.4 2-step RA type non-contention-based random access for NR PCell with CCA

A.11.2.2.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in Clause 6.2.2A.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1, which operates on a carrier frequency with CCA. Supported test parameters are shown in Table A.11.2.2.2.4.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.11.2.2.2.4.1-2.

**Table A.11.2.2.2.4.1-1: Supported test configurations for non-contention based random access test for FR1 PCell with CCA**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: Void. | |

**Table A.11.2.2.2.4.1-2: General test parameters for non-contention based random access test for FR1 PCell with CCA**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Note 4, 6 | | | Config 1 |  | SSB.3 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1 |  | SSB.4 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1 |  | DBT.1 | As specified in A.3.28.1 |
| DL CCA model | | | | Config 1 |  | As specified in A.3.26.2.1 |  |
| UL CCA model | | | | Config 1 |  | As specified in A.3.26.2.2 |  |
| Duplex Mode for Cell 1 | | | | Config 1 |  | TDD |  |
| TDD Configuration | | | | Config 1 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | | | Config 1 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| msgA-*RSRP-ThresholdSSB* | | | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured msgA-*RSRP-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |
|  | |  | | | dB | 3 |
|  | | SS-RSRP | | | dBm/ SCS | -95 |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured msgA-*RSRP-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |
|  | |  | | | dB | -17 |
|  | | SS-RSRP | | | dBm/ SCS | -115 |
| Io Note 2 | | | | Config 1 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | | | |  | FR1 MsgA configuration 2 under CCA | As defined in A.3.20A.2. |
| DL CCA probability | | | Note 4, 6 | |  | 0.9375 |  |
| PCCA\_DL | | | Note 5, 6 | |  | 0.75 / 0.75 |  |
| LCCA\_DL Note 7 | | | | |  | 4 |  |
| WCCA\_DL Note 8 | | | | |  | Inf |  |
| UL CCA probability | | | Note 4, 6 | |  | 0.87 |  |
| PCCA\_UL | | | Note 5, 6 | |  | 0.75 |  |
| LCCA\_UL Note 7 | | | | |  | 5 |  |
| WCCA\_UL Note 8 | | | | |  | Inf |  |
| Semi-static channel access config period Note 4, 6 | | | | | ms | 2 |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds PCCA\_DL1 and the second value corresponds to the PCCA\_DL2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.  Note 7: LCCA\_DL and LCCA\_UL are chosen such that preambleTransMax > 5 + LCCA\_DL + LCCA\_UL.  Note 8: A window WCCA\_DL=WCCA\_UL=Inf is used to indicate that LCCA\_DL and LCCA\_UL are considered during the entire duration of a test run. | | | | | | | |

A.11.2.2.2.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.11.2.2.2.4.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2A.3.2.1, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA PRACH on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

The three requirements below are relevant for all cases of MsgA transmissions described within the clause A.11.2.2.2.4.2:

The System Simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.4.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2A.3.2.2 the System Simulator shall transmit a MsgB containing a fallbackRAR containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 containing the payload of MsgA PUSCH if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed. The UE shall monitor contention resolution as described in clause 8.2A in TS 38.213 [3].

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB’s contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

The system simulator shall implement the UL CCA model of A.3.26.2 for the MsgA occasions where MsgA System Simulator transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on a MsgA occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power in case UL CCA failure.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA and msg3 transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.4.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2A.3.2.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

The System Simulator shall implement the UL CCA model of A.3.26.2 for the MsgA occasions where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on a MsgA occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power in case UL CCA failure.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

### <End of Change 9>

### <Start of Change 10 (R4-2114116)>

## A.10.2 Timing

### A.10.2.1 UE transmit timing

A.10.2.1.1 UE Transmit Timing Test with PSCell under DL CCA

A.10.2.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb when PSCell is subject to DL CCA and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2. Supported test configurations are shown in Table 10.2.1.1.1-1.

**Table A.10.2.1.1.1-1: Supported test configurations for UE transmit timing test**

|  |  |
| --- | --- |
| 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. | |

The test consists of E-UTRA PCell and NR PSCell, which is subject to DL CCA. The configuration for E-UTRA is given in A.3.7.2.1. Table A.10.2.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.10.2.1.1.1-3.

**Table A.10.2.1.1.1-2: Cell Specific Test Parameters for UE Transmit Timing test**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Config** | **Test1** | **Test2** |
| SSB ARFCN | |  | 1,2 | Freq1 | Freq1 |
| TDD configuration | |  | 1,2 | TDDConf.1.1 CCA | |
| BWchannel | | MHz | 1,2 | 40: NRB,c = 106 | |
| Initial BWP Configuration | |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP Configuration | |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | |
| DRX Cycle | | ms | 1,2 | N/A | DRX.8Note5 |
| DL CCA model | |  | 1,2 | As specified in clause A.3.26.2.1 | |
| UL CCA model | |  | 1,2 | As specified in clause A.3.26.2.2 | |
| PDSCH Reference | |  | 1,2 | SR.1.1 CCA | |
| CORESET Reference | |  | 1,2 | CR.1.1 CCA | |
| OCNG Patterns | |  | 1,2 | OCNG pattern 1 | |
| SSB configuration | Semi- static channel acces |  | 1,2 | SSB.1 CCA | |
| Dymamic channel acces |  | 1,2 | SSB.2 CCA | |
| SMTC configuration | |  | 1,2 | SMTC.1 FR1 | |
| TRS configuration | |  | 1,2 | TRS.1.2 TDD | |
| DL CCA probability for semi-static channel access (PCCA\_DL) | |  | 1,2 | 0.9375 | 0.9375 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | |  | 1,2 | 0.75 | 0.75 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | |  | 1,2 | 0.75 | 0.75 |
| UL CCA probability (PCCA\_UL) | |  | 1,2 | 1 | 1 |
| 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 | 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) | |  |  |  |  |
| Note2 | | dBm/30 kHz | 1,2 | -95 | -95 |
|  | |  | 1,2 | 3 | 3 |
|  | |  | 1,2 | 3 | 3 |
| SS-RSRPNote3 | | dBm/30 kHz | 1,2 | -92 | -92 |
| IoNote3 | | dBm/38.1MHz | 1,2 | -59.2 | -59.2 |
| Propagation condition | |  | 1,2 | AWGN | |
| SRS Config | |  | 1,2 | SRSConf.1Note6 | SRSConf.2Note6 |
| 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.  Note 5: DRX related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.10.2.1.1.1-3.  Note 7: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause A.3.26.2.  Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

**Table A.10.2.1.1.1-3: SRS Configuration for UE transmit timing**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Field** | **SRSConf.1** | **SRSConf.2** | **Comments** |
| SRS-ResourceSet | srs-ResourceSetId | 0 | 0 |  |
|  | srs-ResourceIdList | 0 | 0 |  |
|  | resourceType | Periodic | Periodic |  |
|  | Usage | Codebook | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 | 0 |  |
|  | nrofSRS-Ports | Port1 | Port1 |  |
|  | transmissionComb | n2 | n2 |  |
|  | combOffset-n2 | 0 | 0 |  |
|  | cyclicShift-n2 | 0 | 0 |  |
|  | resourceMapping startPosition | 0 | 0 |  |
|  | resourceMapping nrofSymbols | n1 | n1 |  |
|  | resourceMapping  repetitionFactor | n1 | n1 |  |
|  | freqDomainPosition | 0 | 0 |  |
|  | freqDomainShift | 0 | 0 |  |
|  | freqHopping c-SRS | 14 for test configuration 1,2  25 for test configuration 3 | 25 | Matches NRB,c |
|  | freqHopping b-SRS | 0 | 0 |  |
|  | freqHopping b-hop | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither |  |
|  | resourceType | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl1, 0 | sl640, 0 | Offset to align with DRx periodicity |
|  | sequenceId | 0 | 0 | Any 10 bit number |

A.10.2.1.1.2 Test requirements

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test

1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.1-1 and setup NR PSCell according to parameters given in Table A.10.2.1.1.1-1.

2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within (NTA + NTA\_offset)×Tc ± Te of the first detected path of DL SSB.

a. The NTA offset value (in Tc units) is 25600

b. The Te values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.10.2.1.1.2-1

**Table A.10.2.1.1.2-1: Adjustment Value for DL Timing**

|  |  |  |
| --- | --- | --- |
| **SCS of SSB signals (kHz)** | **Adjustment Value** | |
|  | Test1 | Test2 |
| 30 | +32\*64Tc | +16\*64Tc |

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (NTA + NTA\_offset) ×Tc ± Te respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.

5) The test system shall verify that the UE transmit timing offset stays within (NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

### A.10.2.2 UE timing advance

A.10.2.2.1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

A.10.2.2.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.10.2.2.1.2 Test Parameters

Supported test configurations are shown in table A.10.2.2.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.10.2.2.1.2-2, A.10.2.2.1.2-3 and A.10.2.2.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell which is subject to DL CCA is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.10.2.2.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.10.2.2.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

**Table A.10.2.2.1.2-1: Supported test configurations for timing advance test**

|  |  |
| --- | --- |
| 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 only on NR band(s) with shared spectrum access is required to be tested | |

**Table A.10.2.2.1.2-2: General test parameters for timing advance test**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF channel number |  | Cell 1: 1  Cell 2: 2 | 1 for E-UTRAN PCell  2 for NR PSCell |
| Initial DL BWP |  | DLBWP.0.1 | As specified in Table A.3.9.2.1-1 |
| Dedicated DL BWP |  | DLBWP.1.1 | As specified in Table A.3.9.2.2-1 |
| Initial UL BWP |  | ULBWP.0.1 | As specified in Table A.3.9.3.1-1 |
| Dedicated UL BWP |  | ULBWP.1.1 | As specified in Table A.3.9.3.2-1 |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA\_new = NTA\_old* for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *For 30 kHz SCS NTA\_new = NTA\_old + 4096\*Tc*  (based on equation in clause 4.2 of TS 38.213 [3]) |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

**Table A.10.2.2.1.2-3: Cell specific test parameters for timing advance test**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Test1** | |
|  | | | |  | **T1** | **T2** |
| TDD configuration | | | Config 1,2 |  | TDDConf.1.1 CCA | |
| BWchannel | | | Config 1,2 | MHz | 40: NRB,c = 106 | |
| BWP BW | | | Config 1,2 | MHz | 40: NRB,c = 106 | |
| DRX Cycle | | | Config 1,2 | ms | Not Applicable | |
| DL CCA model | | | Config 1,2 |  | As specified in clause A.3.26.2.1 | |
| UL CCA model | | | Config 1,2 |  | As specified in clause A.3.26.2.2 | |
| PDSCH Reference | | | Config 1,2 |  | SR.1.1 CCA | |
| CORESET Reference | | | Config 1,2 |  | CR.1.1 CCA | |
| TRS configuration | | | Config 1,2 |  | TRS.1.2 TDD | |
| OCNG Patterns | | | Config 1,2 |  | OCNG pattern 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 FR1 | |
| DL CCA probability for semi-static channel access (PCCA\_DL) | | | Config 1,2 |  | 1 | |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | | Config 1,2 |  | 1 | |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | | Config 1,2 |  | 1 | |
| UL CCA probability PCCA | | | Config 1,2 |  | 1 | |
| 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 | Config 1,2 | | | dBm/30 kHz | -95 | |
|  | Config 3,6 | | |  | -95 | |
|  | | | | dB | 3 | |
|  | | | | dB | 3 | |
| IoNote3 | Config 1,2 | | | dBm/38.16MHz | -62.58 | |
| 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.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause A.3.26.2.  Note 5: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | |

**Table A.10.2.2.1.2-4: Sounding Reference Symbol Configuration for timing advance test**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | | **Value** | **Comment** |
| c-SRS | Config 1,2 | 24 | Frequency hopping is disabled |
| b-SRS | | 0 |  |
| b-hop | | 0 |  |
| freqDomainPosition | | 0 | Frequency domain position of SRS |
| freqDomainShift | | 0 |  |
| groupOrSequenceHopping | | neither | No group or sequence hopping |
| SRS-PeriodicityAndOffset | | sl5=4 for SCS 30kHz | Once every 5 slots |
| pathlossReferenceRS | | ssb-Index=0 | SSB #0 is used for SRS path loss estimation |
| usage | | Codebook | Codebook based UL transmission |
| startPosition | | 0 | resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition. |
| nrofSymbols | | n1 |  |
| repetitionFactor | | n1 |  |
| combOffset-n2 | | 0 | transmissionComb setting |
| cyclicShift-n2 | | 0 |  |
| nrofSRS-Ports | | port1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 38.331 [2]. | | | |

A.10.2.2.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. *k+1* slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.11.3 Timing

### A.11.3.1 UE transmit timing

A.11.3.1.1 UE Transmit Timing Test with PCell under DL CCA

A.11.3.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb when PCell is subject to DL CCA and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 11.3.1.1.1-1

**Table A.11.3.1.1.1-1: Supported test configuration for UE transmit timing test**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |

For this test a single NR cell is used. Table A.11.3.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.11.3.1.1.1-3.

**Table A.11.3.1.1.1-2: Cell Specific Test Parameters for UE transmit timing test**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Configuration** | **Test1** | **Test2** |
| SSB ARFCN | |  | 1 | 1 | 1 |
| TDD configuration | |  | 1 | TDDConf.1.1 CCA | |
| BWchannel | | MHz | 1 | 40: NRB,c = 106 | |
| Initial BWP Configuration | |  | 1 | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP Configuration | |  | 1 | DLBWP.1.1  ULBWP.1.1 | |
| DRX Cycle | | ms | 1 | N/A | DRX.8Note5 |
| DL CCA model | |  | 1 | As specified in clause A.3.26.2.1 | |
| UL CCA model | |  | 1 | As specified in clause A.3.26.2.2 | |
| PDSCH Reference measurement channel | |  | 1 | SR.1.1 CCA | |
| RMSI CORESET Reference Channel | |  | 1 | CR.1.1 CCA | |
| Dedicated CORESET Reference Channel | |  | 1 | CCR.1.1 CCA | |
| OCNG Patterns | |  | 1 | OP.1 | |
| SSB configuration | Semi- static channel acces |  | 1 | SSB.1 CCA | |
| Dymamic channel acces |  | 1 | SSB.2 CCA | |
| SMTC Configuration | |  | 1 | SMTC.1 FR1 | |
| TRS configuration | |  | 1 | TRS.1.2 TDD | |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | |  | 1 | 0.9375 | 0.9375 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | |  | 1 | 0.75 | 0.75 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | |  | 1 | 0.75 | 0.75 |
| UL CCA probability (PCCA\_UL) | |  | 1 | 1 | 1 |
| EPRE ratio of PSS to SSS | | dB | 1 | 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) | |  |  |  |  |
| Note2 | | dBm/30 KHz | 1 | -95 | -95 |
|  | |  | 1 | 3 | 3 |
|  | |  | 1 | 3 | 3 |
| SS-RSRPNote3 | | dBm/30 kHz | 1 | -92 | -92 |
| IoNote3 | | dBm/38.1MHz | 1 | -59.2 | -59.2 |
| Propagation condition | |  | 1 | AWGN | |
| SRS Config | |  | 1 | SRSConf.1Note6 | SRSConf.2Note6 |
| 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.  Note 5: DRX related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.11.3.1.1.1-3  Note 7: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause A.3.26.2.  Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

**Table A.11.3.1.1.1-3: SRS Configuration for UE transmit timing test**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Field** | **SRSConf.1** | **SRSConf.2** | **Comments** |
| SRS-ResourceSet | srs-ResourceSetId | 0 | 0 |  |
|  | srs-ResourceIdList | 0 | 0 |  |
|  | resourceType | Periodic | Periodic |  |
|  | Usage | Codebook | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 | 0 |  |
|  | nrofSRS-Ports | Port1 | Port1 |  |
|  | transmissionComb | n2 | n2 |  |
|  | combOffset-n2 | 0 | 0 |  |
|  | cyclicShift-n2 | 0 | 0 |  |
|  | resourceMapping startPosition | 0 | 0 |  |
|  | resourceMapping nrofSymbols | n1 | n1 |  |
|  | resourceMapping  repetitionFactor | n1 | n1 |  |
|  | freqDomainPosition | 0 | 0 |  |
|  | freqDomainShift | 0 | 0 |  |
|  | freqHopping c-SRS | 14 for test configuration 1,2  25 for test configuration 3 | 25 | Matches NRB,c |
|  | freqHopping b-SRS | 0 | 0 |  |
|  | freqHopping b-hop | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither |  |
|  | resourceType | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl1, 0 | sl640, 0 | Offset to align with DRX periodicity |
|  | sequenceId | 0 | 0 | Any 10 bit number |

A.11.3.1.1.2 Test requirements

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test

1) Setup NR PCell according to parameters given in Table A.11.3.1.1.1-1.

2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within (NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SSB.

a. The NTA offset value (in Tc units) is 25600

b. The Te values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.11.3.1.1.2-1

**Table A.11.3.1.1.2-1: Adjustment Value for DL Timing**

|  |  |  |
| --- | --- | --- |
| **SCS of SSB signals (KHz)** | **Adjustment Value** | |
|  | Test1 | Test2 |
| 30 | +32\*64Tc | +16\*64Tc |

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (NTA + NTA\_offset) ×Tc ± Te respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.

5) The test system shall verify that the UE transmit timing offset stays within (NTA + NTA\_offset) ×Tc ± Te of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

### A.11.3.2 UE timing advance

#### A.11.3.2.1 UE Timing Advance Adjustment Accuracy with PCell under DL CCA

##### A.11.3.2.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

##### A.11.3.2.1.2 Test Parameters

Supported test configurations are shown in table A.11.3.2.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.11.3.2.1.2-2, A.11.3.2.1.2-3 and A.11.3.2.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.11.3.2.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.11.3.2.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.11.3.2.1.2-1: Supported test configuration for timing advance test

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE supporting SA operation only on NR band(s) with shared spectrum access is required to be tested | |

Table A.11.3.2.1.2-2: General test parameters for timing advance test

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF channel number |  | 1 |  |
| Initial DL BWP |  | DLBWP.0.1 | As specified in Table A.3.9.2.1-1 |
| Dedicated DL BWP |  | DLBWP.1.1 | As specified in Table A.3.9.2.2-1 |
| Initial UL BWP |  | ULBWP.0.1 | As specified in Table A.3.9.3.1-1 |
| Dedicated UL BWP |  | ULBWP.1.1 | As specified in Table A.3.9.3.2-1 |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA\_new = NTA\_old* for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | For 30 kHz SCS *NTA\_new = NTA\_old + 4096\*Tc*  (based on equation in clause 4.2 of TS 38.213 [3]) |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

Table A.11.3.2.1.2-3: Cell specific test parameters for timing advance test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test1 | |
|  | | |  | T1 | T2 |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 | |
| BWP BW | | Config 1 | MHz | 40: NRB,c = 106 | |
| DRX Cycle | | Config 1 | ms | Not Applicable | |
| DL CCA model | | Config 1 |  | As specified in clause A.3.26.2.1 | |
| UL CCA model | | Config 1 |  | As specified in clause A.3.26.2.2 | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | |
| OCNG Patterns | | Config 1 |  | OCNG pattern 1 | |
| SMTC configuration | | Config 1 |  | SMTC.1 FR1 | |
| SSB configuration | Semi- static channel acces | Config 1 |  | SSB.1 CCA | |
| Dymamic channel acces | Config 1 |  | SSB.2 CCA | |
| DL CCA probability for semi-static channel access (PCCA\_DL) | | Config 1 |  | 1 | |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | Config 1 |  | 1 | |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | Config 1 |  | 1 | |
| UL CCA probability PCCA | | 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) | | |  |  | |
| Note2 | | Config 1 | dBm/30 kHz | -95 | |
|  | | | dB | 3 | |
|  | | | dB | 3 | |
| IoNote3 | | Config 1 | dBm/  38.16MHz | -62.58 | |
| 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.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause A.3.26.2.  Note 5: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

Table A.11.3.2.1.2-4: Sounding Reference Symbol Configuration for Timing Advance Accuracy Test

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| c-SRS | 24 | Frequency hopping is disabled |
| b-SRS | 0 |  |
| b-hop | 0 |  |
| freqDomainPosition | 0 | Frequency domain position of SRS |
| freqDomainShift | 0 |  |
| groupOrSequenceHopping | neither | No group or sequence hopping |
| SRS-PeriodicityAndOffset | sl5=4 for SCS 30kHz | Once every 5 slots |
| pathlossReferenceRS | ssb-Index=0 | SSB #0 is used for SRS path loss estimation |
| usage | Codebook | Codebook based UL transmission |
| startPosition | 0 | resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition. |
| nrofSymbols | n1 |  |
| repetitionFactor | n1 |  |
| combOffset-n2 | 0 | transmissionComb setting |
| cyclicShift-n2 | 0 |  |
| nrofSRS-Ports | port1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 38.331 [2]. | | |

##### A.11.3.2.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. *k+1* slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

### <End of Change 10>

### <Start of Change 11 (R4-2114440)>

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.3.26.2.1 |  |
| UL CCA model |  | As specified in clause A.3.26.2.2 |  |
| *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 probabilityfor semi-static channel access (PCCA\_DL) | | Config 1,2 |  | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | Config 1,2 |  | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | Config 1,2 |  | 1 |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | | 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].  Note 5: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause A.3.26.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | |

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.3.26.2.1 |  |
| UL CCA model |  | As specified in clause A.3.26.2.2 |  |
| 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 probabilityfor semi-static channel access (PCCA\_DL) | | Config 1,2 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | Config 1,2 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | Config 1,2 |  | 1 | 1 |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | | 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].  Note 5: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause A.3.26.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

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.3.26.2.1 |  |
| UL CCA model |  | As specified in clause A.3.26.2.2 |  |
| 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 probabilityfor semi-static channel access (PCCA\_DL) | | | Config 1,2 |  | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | | Config 1,2 |  | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | | Config 1,2 |  | 1 |
| DL CCA probabilityfor semi-static channel access (PCCA\_DL) | | | 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].  Note 5: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause A.3.26.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

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%.

### <End of Change 11>

### <Start of Change 12 (R4-2114118)>

### A.11.4.5 Active BWP switching

#### A.11.4.5.1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

A.11.4.5.1.1 Test Purpose and Environment

The purpose of this test is to verify the UL BWP switch delay requirement defined in clause 8.6.4.

The supported test configurations are shown in Table A.11.4.5.1.1-1. The test scenario comprises of one cell (Cell 1), which is Pcell as given in Table A.11.4.5.1.1-2. Cell-specific parameters of the cell are specified in Table A.11.4.5.1.1-3 below. SRS configuration used in the test is specified in Table A.11.4.5.1.1-4.

Before the test starts,

* UE is connected to Cell 1 on radio channel 1.
* UE is configured with 2 different UE-specific downlink and uplink bandwidth parts: DL BWP-1, DL BWP-2, UL BWP-1 and UL BWP-2 before starting the test. DL BWP-1 and DL BWP-2 always include bandwidth of the initial DL BWP and SSB. UL BWP-1 and UL BWP-2 always include bandwidth of the SRS.
* UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis DL BWP-1.
* UE is indicated in *firstActiveUplinkBWP-Id* that the active UL BWPis UL BWP-1.
* UE is configured with *LBT-FailureRecoveryConfig* parameters for Cell 1.

The cell has constant signal levels throughout the test. The test consists of 2 successive time periods, with durations of T1 and T2, respectively.

During T1,

* Time period T1 starts when the UE has received the SRS configuration for periodic SRS transmission on active UL BWP-1.
* The UE shall perform UL CCA before SRS transmission.
* The parameter UL CCA probability PCCA is set to 0 during T1. This requires the test system to set energy level above the detection level during portion of the UL slot where the UE performs UL CCA. This in turn forces the UE to fail the UL CCA. The UE consistently fails UL CCA during T1 and is therefore unable to transmit SRS.

During T2,

* T2 starts when the UE detects consistent UL LBT failures i.e. when total number of UL LBT failures in cell1 on active UL BWP-1 exceeds *lbt-FailureInstanceMaxCount* during *lbt-FailureDetectionTimer.*
* The UE upon detected consistent UL LBT failure starts the LBT recovery mechanism, which requires the UE to switch to active UL BWP-2 in Cell 1 and to send PRACH in the active UL BWP-2.
* Staring from T2, the UE shall be able to send PRACH in the active UL BWP-2 within the delay specified in clause 8.6.4.

**Table A.11.4.5.1.1-1: Supported test configurations for UL BWP switch test in SA**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: void | |

**Table A.11.4.5.1.1-2: General test parameters for UL BWP switch test 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 |  |
| *lbt-FailureDetectionTimer* [2] | ms | 80 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [1] |
| *lbt-FailureInstanceMaxCount* [2] |  | 4 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [1] |
| T1 | s | 0.1 | During T1 consistent LBT failure is detected on active UL BWP-1 |
| T2 | s | 0.1 | During T2 UE sends PRACH on active UL BWP-2 |

**Table A.11.4.5.1.1-3: NR Cell specific test parameters for UL BWP switch test in SA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** | |
| **T1** | **T2** |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1 |  | 40 MHz: NRB,c = 106 | |
| DL CCA model | | Config 1 |  | As specified in clause A.3.26.2.1 | |
| UL CCA model | | Config 1 |  | As specified in clause A.3.26.2.2 | |
| Active BWP ID | | Config 1 |  | 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.1.3 CCA | |
| OCNG Patterns | | Config 1 |  | 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 FR1 | |
| Correlation Matrix and Antenna Configuration | | Config 1 |  | 1x2 Low | |
| TRS Configuration | | Config 1 |  | TRS.1.2 TDD | |
| DL CCA probability for semi-static channel access (PCCA\_DL) | | Config 1 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_1) | | Config 1 |  | 1 | 1 |
| DL CCA model probability for dynamic static channel access (PCCA\_DL\_2) | | Config 1 |  | 1 | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1 |  | 0 | 1 |
| PRACH configuration | | Config 1 |  | N/A | Configuration #1 in Table A.3.8.2.1-1 |
| 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/  38.16MHz | -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].  Note 5: Parameters PCCA\_DL, PCCA\_DL\_1, PCCA\_DL\_2 and PCCA\_UL are defined in clause A.3.26.2.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | |

**Table A.11.4.5.1.1-4: Sounding Reference Symbol Configuration for UL BWP Switch Test**

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| c-SRS | 24 | Frequency hopping is disabled |
| b-SRS | 0 |  |
| b-hop | 0 |  |
| freqDomainPosition | 0 | Frequency domain position of SRS |
| freqDomainShift | 0 |  |
| groupOrSequenceHopping | neither | No group or sequence hopping |
| SRS-PeriodicityAndOffset | sl5=4 for SCS 30kHz | Once every 5 slots |
| pathlossReferenceRS | ssb-Index=0 | SSB #0 is used for SRS path loss estimation |
| usage | Codebook | Codebook based UL transmission |
| startPosition | 0 | resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition. |
| nrofSymbols | n1 |  |
| repetitionFactor | n1 |  |
| combOffset-n2 | 0 | transmissionComb setting |
| cyclicShift-n2 | 0 |  |
| nrofSRS-Ports | port1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 38.331 [2]. | | |

##### A.11.4.5.1.2 Test Requirements

The UE capable of *bwp-SwitchingDelay* *type1* [2] shall start to transmit the PRACH on active UL BWP-2 of Cell 1 (PCell) less than 21.5 ms from the beginning of time period T1.

The UE capable of *bwp-SwitchingDelay* *type2* [2] shall start to transmit the PRACH on active UL BWP-2 of Cell 1 (PCell) less than 23 ms from the beginning of time period T1.

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

NOTE: The above delay is calculated as follows:’

The active UL BWP switch delay from UL BWP-1 to UL BWP-2 can be expressed as:

TBWPswitchDelay\*Tslot +1\*Tslot + (1+ L3)\*TSSB,RO + 10 ms

Where:

TBWPswitchDelay = 1 ms (2 slots) and 2.5 ms (5 slots) for *bwp-SwitchingDelay* [2] *type1* and *type2* UE capabilities according to clause 8.6.4.

Tslot = It is the slot length. It is 0.5 ms for 30 kHz.

L3 = It is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. L3= 0 during T2 since PCCA = 1.

TSSB,RO = 10 ms according to FR1 PRACH configuration 1.

This gives a total of 21.5 ms and 23 ms for *type1* and *type2* UE respectively.

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: Void  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.3.26.2.1 |  |
| UL CCA model |  | As specified in clause A.3.26.2.2 |  |
| *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.1.3 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.3.26.2.1 | |  |
| UL CCA model |  | As specified in clause A.3.26.2.2 | |  |
| *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.1.3 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: Void  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.3.26.2.1 |  |
| UL CCA model |  | As specified in clause A.3.26.2.2 |  |
| 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.1.3 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 Change 12>

### <Start of Change 13 (R4-2114173)>

A.10.3.3 SCell activation and deactivation delay

A.10.3.3.1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 160 ms SCell measurement cycle

A.10.3.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for NR SCell, with NR PSCell and NR SCell both under CCA, are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 160 ms.

The supported test configurations are shown in Table A.10.3.3.1.1-1.

The test parameters are given in Table A.10.3.3.1.1-2 and cell-specific parameters for NR cells are provided in Table A.10.3.3.1.1-3 below. Cell-specific parameters for EUTRA PCell are provided in clause A.3.7.2.1.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in E-UTRA, Cell 2 (PSCell) on radio channel 2 (PSCC) in NR, and Cell3 (SCell) on radio channel 3 (SCC) in NR. Before the test starts the UE is connected to Cell 1 and Cell 2, but is not aware of Cell 3, as the UE is only monitoring PCC and PSCC. 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 radio channel 2. The UE now starts monitoring the SCC. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

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 a valid CSI in PSCell for the activated SCell at latest in slot *m* + (THARQ+ Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, as defined in clause 8.3A.2. The UE shall start reporting CSI in PSCell in first available uplink resource for CSI reporting following slot *m+* and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption shall fall within the time window specified in clause 8.3A.2.

The point in time at which the MAC message is received by at the UE antenna connector, in a slot # denoted *n*, defines the start of time period T3. The UE shall complete the activation at latest in slot . Any PSCell interruption shall fall within the time window specified in clause 8.3A.3.

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, while taking into account CCA failures on SCC.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.10.3.3.1.1-1: Supported test configurations for SCell Activation and Deactivation of known NR SCell with NR PSCell and SCell under CCA, 160 ms SCell measurement cycle**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | PCC: LTE FDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | PCC: LTE TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 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.10.3.3.1.1-2: General test parameters for known SCell activation case with NR PSCell and SCell under CCA, 160 ms SCell measurement cycle**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2,3 | Three radio channels (1, 2, 3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 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 |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every second subframe |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell 3 timing offset to Cell 2 | μs | 0 |  |
| Time alignment error between Cell 3 and Cell 2 | μs | ≤ TAE 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 PCell and PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate 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 |  | 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]  is the subcarrier spacing configuration for DL |

**Table A.10.3.3.1.1-3: Cell specific test parameters for known SCell activation case with NR PSCell and SCell under CCA, 160 ms SCell measurement cycle**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | | | **Cell 3** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Duplex mode | Config 1,2 |  | TDD | | | TDD | | |
| TDD configuration | Config 1,2 |  | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | | |
| BWchannel | Config 1,2 | MHz | 40: NRB,c = 106 | | | 40: NRB,c = 106 | | |
| DL CCA model | |  | As specified in clause A.3.26.2.1 | | | As specified in clause A.3.26.2.1 | | |
| UL CCA model | |  | As specified in clause A.3.26.2.2 | | | As specified in clause A.3.26.2.2 | | |
| DL CCA probability for semi-static channel accessNote5,7 | PCCA\_DL |  | 0.9375 | | | 0.9375 | | |
| DL CCA probability for dynamic channel accessNote6,7 | PCCA\_DL\_1 |  | 0.75 | | | 0.75 | | |
| PCCA\_DL\_2 |  | 0.75 | | | 0.75 | | |
| UL CCA probability for semi-static channel access | PCCA\_UL |  | 0.87 | | | 0.87 | | |
| UL CCA probability for dynamic channel access | PCCA\_UL |  | 0.75 | | | 0.75 | | |
| LCCA\_DL Note 8 | |  | 2 | | | 2 | | |
| WCCA\_DL Note 8 | |  | Tactivation\_time\_withCCA | | | Tactivation\_time\_withCCA | | |
| Initial downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Initial uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Dedicated downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Dedicated uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| TCI state | |  | TCI.State.0 | | | TCI.State.0 | | |
| TRS Configuration | Config 1,2 |  | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.1.1 CCA | | | SR.1.1 CCA | | |
| Dedicated CORESET parameters | Config 1,2 |  | CCR.1.3 CCA | | | CCR.1.3 CCA | | |
| RMSI CORESET parameters | Config 1,2 |  | CR.1.1 CCA | | | CR.1.1 CCA | | |
| OCNG Patterns Note1 | |  | OP.1 | | | OP.1 | | |
| SSB Configuration for semi-static channel accessNote5,7 | Config 1,2 |  | SSB.1 CCA | | | SSB.1 CCA | | |
| SSB Configuration for dynamic channel accessNote6,7 | Config 1,2 |  | SSB.2 CCA | | | SSB.2 CCA | | |
| SMTC configuration | |  | SMTC.1 | | | SMTC.1 | | |
| DBT window configuration | |  | DBT.1 | | | DBT.1 | | |
| 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 SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| *Noc* Note2 | Config 1,2 | dBm/15kHz | -104 | | | -104 | | |
| *Noc* Note2 | Config 1,2 | dBm/SCS | -101 | | | -101 | | |
| *Ês/Iot* | | dB | 17 | | | 17 | | |
| *Ês/Noc* | | dB | 17 | | | 17 | | |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -84 | | | -84 | | |
| IoNote3 | Config 1,2 | dBm/  38.16MHz | -52.87 | | | -52.87 | | |
| Propagation condition | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  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, SCH\_RP and Io 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: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.  Note 8: As specified in clause 8.3A for L1,max, L2,1,max, L2,2,max, L3,1,max, andL3,2,max | | | | | | | | |

A.10.3.3.1.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot *m +* (THARQ+ Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB + L1\*Trs + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in clause 8.3A.3.

During T2, interruption on PSCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB.

During T3, interruption on PSCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PSCell shall not be more than specified for EN-DC in clause 8.2.1.2.4.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.10.3.3.2 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 320 ms SCell measurement cycle

A.10.3.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for NR SCell, with NR PSCell and NR SCell both under CCA, are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 320 ms.

The supported test configurations are same as in Table A.10.3.3.1.1-1 above.

The test parameters are same as in Table A.10.3.3.1.1-2 above, except for parameters listed below in Table A.10.3.3.2.1-1. The cell-specific parameters are same as in Table A.10.3.3.1.1-3 above.

The test execution is the same as described in clause A.10.3.3.1 above.

**Table A.10.3.3.2.1-1: General test parameters for known NR SCell activation with NR PSCell and SCell under CCA, 320 ms SCell measurement cycle**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| SCell measurement cycle (measCycleSCell) | ms | 320 |  |

A.10.3.3.2.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot *m +* (THARQ+ Tactivation\_time\_withCCA + TCSI\_reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB\_MAX + L2,1\*TSMTC\_MAX + (1 +L2,2)\*Trs + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in clause 8.3A.3.

During T2, interruption on PSCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB\_MAX + L2,1\* TSMTC\_MAX.

During T3, interruption on PSCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PSCell shall not be more than specified for EN-DC in clause 8.2.1.2.4.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.10.3.3.3 SCell Activation and Deactivation of unknown NR SCell with NR PSCell and NR SCell under CCA

A.10.3.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for NR SCell, with NR PSCell and NR SCell both under CCA, are within the requirements stated in clause 8.3A, when the SCell is unknown to the UE at the time of activation.

The supported test configurations are same as in Table A.10.3.3.1.1-1 above.

The test parameters are same as in Table A.10.3.3.1.1-2 above, except for parameters listed below in Table A.10.3.3.3.1-1. The cell-specific parameters are same as in Table A.10.3.3.1.1-3 above.

The test execution is the same as described in clause A.10.3.3.1 above.

**Table A.10.3.3.3.1-1: General test parameters for unknown NR SCell activation with NR PSCell and SCell under CCA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| T1 | s | 0.1 | During this time period PCell and PSCell shall be known and the SCell configured, but not detected. |

A.10.3.3.3.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot *m +* (THARQ+ Tactivation\_time\_withCCA + TCSI\_reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB\_MAX + (1 + L3,1)\*TSMTC\_MAX + (2 + L3,2)\*Trs + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in clause 8.3A.3.

During T2, interruption on PSCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB\_MAX + L3,1\* TSMTC\_MAX.

During T3, interruption on PSCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PSCell shall not be more than specified for EN-DC in clause 8.2.1.2.4.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.11.4.3 SCell activation and deactivation delay

A.11.4.3.1 SCell Activation and Deactivation of known SCell with PCell and SCell under CCA, 160 ms SCell measurement cycle

A.11.4.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell, with PCell and SCell both under CCA, are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 160 ms.

The supported test configurations are shown in Table A.11.4.3.1.1-1.

The test parameters are given in Table A.11.4.3.1.1-2 and cell-specific parameters in Table A.11.4.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in NR with CCA, and Cell2 (SCell) on radio channel 2 (SCC) in NR with CCA. Before the test starts the UE is connected to Cell 1, but is not aware of Cell 2, as 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. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

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 a valid CSI in PCell for the activated SCell at latest in slot *m* + (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, as defined in clause 8.3A.2. The UE shall start reporting CSI in PCell in first available uplink resource for CSI reporting following slot *m+* and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption shall fall within the time window specified in clause 8.3.2.

The point in time at which the MAC message is received by at the UE antenna connector, in a slot # denoted *n*, defines the start of time period T3. The UE shall complete the activation at latest in slot . Any PCell interruption shall fall within the time window specified in clause 8.3A.3.

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, while taking into account CCA failures on SCC.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.11.4.3.1.1-1: Supported test configurations for SCell Activation and Deactivation of known SCell with PCell and SCell under CCA, 160 ms SCell measurement cycle**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

**Table A.11.4.3.1.1-2: General test parameters for known SCell activation with PCell and SCell under CCA, 160 ms SCell measurement cycle**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2 | Two radio channels (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 |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every second subframe |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ TAE 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 PCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate 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 |  | 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]  is the subcarrier spacing configuration for DL |

**Table A.11.4.3.1.1-3: Cell specific test parameters for known SCell activation case with PCell and SCell under CCA, 160 ms SCell measurement cycle**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | | **Cell 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Duplex mode | Config 1 |  | TDD | | | TDD | | |
| TDD configuration | Config 1 |  | TDDConf.1.1 CCA | | | TDDConf.1.1 CCA | | |
| BWchannel | Config 1 | MHz | 40: NRB,c = 106 | | | 40: NRB,c = 106 | | |
| DL CCA model | |  | As specified in clause A.3.26.2.1 | | | As specified in clause A.3.26.2.1 | | |
| UL CCA model | |  | As specified in clause A.3.26.2.2 | | | As specified in clause A.3.26.2.2 | | |
| DL CCA probability for semi-static channel accessNote5,7 | PCCA\_DL |  | 0.9375 | | | 0.9375 | | |
| DL CCA probability for dynamic channel accessNote6,7 | PCCA\_DL\_1 |  | 0.75 | | | 0.75 | | |
| PCCA\_DL\_2 |  | 0.75 | | | 0.75 | | |
| UL CCA probability for semi-static channel access | PCCA\_UL |  | 0.87 | | | 0.87 | | |
| UL CCA probability for dynamic channel access | PCCA\_UL |  | 0.75 | | |  | | |
| LCCA\_DL Note 8 | |  | 2 | | | 2 | | |
| WCCA\_DL Note 8 | | ms | Tactivation\_time\_withCCA | | | Tactivation\_time\_withCCA | | |
| Initial downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Initial uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Dedicated downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Dedicated uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| TCI state | |  | TCI.State.0 | | | TCI.State.0 | | |
| TRS Configuration | Config 1 |  | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 CCA | | | SR.1.1 CCA | | |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.3 CCA | | | CCR.1.3 CCA | | |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 CCA | | | CR.1.1 CCA | | |
| OCNG Patterns Note1 | |  | OP.1 | | | OP.1 | | |
| SSB Configuration for semi-static channel accessNote5,7 | Config 1 |  | SSB.1 CCA | | | SSB.1 CCA | | |
| SSB Configuration for dynamic channel accessNote6,7 | Config 1 |  | SSB.2 CCA | | | SSB.2 CCA | | |
| SMTC configuration | |  | SMTC.1 | | | SMTC.1 | | |
| 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 SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| *Noc* Note2 | Config 1 | dBm/15kHz | -104 | | | -104 | | |
| *Noc* Note2 | Config 1 | dBm/SCS | -101 | | | -101 | | |
| *Ês/Iot* | | dB | 17 | | | 17 | | |
| *Ês/Noc* | | dB | 17 | | | 17 | | |
| SS-RSRP Note3 | Config 1 | dBm/SCS | -84 | | | -84 | | |
| IoNote3 | Config 1 | dBm/  38.16MHz | -52.87 | | | -52.87 | | |
| Propagation condition | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  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, SCH\_RP and Io 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: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.  Note 8: As specified in clause 8.3A for L1,max, L2,1,max, L2,2,max, L3,1,max, andL3,2,max | | | | | | | | |

A.11.4.3.1.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot *m +* (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB + L1\*Trs + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB.

During T3, interruption on PCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.11.4.3.2 SCell Activation and Deactivation of known SCell with PCell and SCell under CCA, 320 ms SCell measurement cycle

A.11.4.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell, with PCell and SCell under CCA, are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 320 ms.

The supported test configurations are same as in Table A.11.4.3.1.1-1 above.

The test parameters are same as in Table A.11.4.3.1.1-2 above, except for parameters listed below in Table A.11.4.3.2.1-1. The cell-specific parameters are same as in Table A.11.4.3.1.1-3 above.

The test execution is the same as described in clause A.11.4.3.1 above.

**Table A.11.4.3.2.1-1: General test parameters for known SCell activation with PCell and SCell under CCA, 320 ms SCell measurement cycle**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| SCell measurement cycle (measCycleSCell) | ms | 320 |  |

A.11.4.3.2.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot *m +* (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB\_MAX + L2,1\*TSMTC\_MAX + (1 +L2,2)\*Trs + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB\_MAX + L2,1\* TSMTC\_MAX.

During T3, interruption on PCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.11.4.3.3 SCell Activation and Deactivation of unknown SCell with PCell and SCell under CCA

A.11.4.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell, with PCell and SCell under CCA, are within the requirements stated in clause 8.3A, when the SCell is unknown to the UE at the time of activation.

The supported test configurations are same as in Table A.11.4.3.1.1-1 above.

The test parameters are same as in Table A.11.4.3.1.1-2 above, except for parameters listed below in Table A.11.4.3.3.1-1. The cell-specific parameters are same as in Table A.11.4.3.1.1-3 above.

The test execution is the same as described in clause A.11.4.3.1 above.

**Table A.11.4.3.3.1-1: General test parameters for unknown SCell activation with PCell ans SCell under CCA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| T1 | s | 0.1 | During this time period the PCell shall be known and the SCell configured, but not detected. |

A.11.4.3.3.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot *m +* (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB\_MAX + (1 + L3,1)\*TSMTC\_MAX + (2 + L3,2)\*Trs + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB\_MAX + L3,1\* TSMTC\_MAX.

During T3, interruption on PCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.13.2.2 SCell activation and deactivation delay

A.13.2.2.1 SCell Activation and Deactivation of known SCell under CCA, 160 ms SCell measurement cycle

A.13.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell on NR-U SCC with CCA are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 160 ms.

The supported test configurations are shown in Table A.13.2.2.1.1-1.

The test parameters are given in Table A.13.2.2.1.1-2 and cell-specific parameters in Table A.13.2.2.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in NR FR1, and Cell2 (SCell) on radio channel 2 (SCC) in NR with CCA. Before the test starts the UE is connected to Cell 1, but is not aware of Cell 2, as 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. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

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 a valid CSI in PCell for the activated SCell at latest in slot *m* + , as defined in clause 8.3A.2. The UE shall start reporting CSI in PCell in slot *m+* and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption shall fall within the time window specified in clause 8.3A.2. At the end of T2 the test equipment sends a MAC message for deactivation of the SCell.

The point in time at which the MAC message is received by at the UE antenna connector, in a slot # denoted *n*, defines the start of time period T3. The UE shall complete the activation at latest in slot . Any PCell interruption shall fall within the time window specified in clause 8.3A.3.

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, while taking into account CCA failures on SCC.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.13.2.2.1.1-1: Supported test configurations for SCell Activation and Deactivation of known SCell under CCA, 160 ms SCell measurement cycle**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 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.13.2.2.1.1-2: General test parameters for known SCell activation with SCell under CCA, 160 ms SCell measurement cycle**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2 | Two radio channels (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 |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every fourth slot |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ TAE 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 PCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate 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 |  | 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]  is the subcarrier spacing configuration for DL |

**Table A.13.2.2.1.1-3: Cell specific test parameters for known FR1 SCell activation case with SCell under CCA, 160 ms SCell measurement cycle**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | | **Cell 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Duplex mode | Config 1 |  | FDD | | | TDD | | |
| Config 2,3 | TDD | | |
| TDD configuration | Config 1 |  | --- | | | TDDConf.1.1 CCA | | |
| Config 2 | TDDConf.1.1 | | |
| Config 3 | TDDConf.2.1 | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | 40: NRB,c = 106 | | |
| Config 3 | 40: NRB,c = 106 | | |
| DL CCA model | |  | --- | | | As specified in clause A.3.26.2.1 | | |
| DL CCA probability for semi-static channel accessNote5,7 | PCCA\_DL |  | --- | | | 0.9375 | | |
| DL CCA probability for dynamic channel accessNote6,7 | PCCA\_DL\_1 |  | --- | | | 0.75 | | |
| PCCA\_DL\_2 |  | --- | | | 0.75 | | |
| PCCA\_UL | |  |  | | | 1 | | |
| LCCA\_DL Note 8 | |  |  | | | 2 | | |
| WCCA\_DL Note 8 | | ms |  | | | Tactivation\_time\_withCCA | | |
| Initial downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Initial uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Dedicated downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | |
| Dedicated uplink BWP configuration | |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| TCI state | |  | TCI.State.0 | | | TCI.State.0 | | |
| TRS Configuration | Config 1 |  | TRS.1.1 FDD | | | TRS.1.2 TDD | | |
| Config 2 | TRS.1.1 TDD | | |
| Config 3 | TRS.1.2 TDD | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | SR.1.1 CCA | | |
| Config 2 | SR.1.1 TDD | | |
| Config 3 | SR.2.1 TDD | | |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | | | CCR.1.3 CCA | | |
| Config 2 | CCR.1.1 TDD | | |
| Config 3 | CCR.2.1 TDD | | |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | | | CR.1.1 CCA | | |
| Config 2 | CR.1.1 TDD | | |
| Config 3 | CR.2.1 TDD | | |
| OCNG Patterns Note1 | |  | OP.1 | | | OP.1 | | |
| SSB Configuration for semi-static channel accessNote5,7 | Config 1,2 |  | SSB.1 FR1 | | | SSB.1 CCA | | |
| Config 3 | SSB.2 FR1 | | |
| SSB Configuration for dynamic channel accessNote6,7 | Config 1,2 |  | SSB.1 FR1 | | | SSB.2 CCA | | |
| Config 3 | SSB.2 FR1 | | |
| SMTC configuration | |  | SMTC.1 | | | SMTC.1 | | |
| DBT window configuration | |  | --- | | | DBT.1 | | |
| 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 SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| *Noc* Note2 | Config 1,2 | dBm/15kHz | -104 | | | -104 | | |
| Config 3 |
| *Noc* Note2 | Config 1,2 | dBm/SCS | -104 | | | -101 | | |
| Config 3 | -101 | | |
| *Ês/Iot* | | dB | 17 | | | 17 | | |
| *Ês/Noc* | | dB | 17 | | | 17 | | |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -87 | | | -84 | | |
| Config 3 | -84 | | | -84 | | |
| IoNote3 | Config 1,2 |  | -58.96 | | | -52.87 | | |
| Config 3 |  | -52.87 | | | -52.87 | | |
| Propagation condition | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For Cell 2 with CCA model, OCNG is transmitted only in slots with downlink transmission bursts and is not transmitted during muted slots or during DBT windows.  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, SCH\_RP and Io 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: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.  Note 8: As specified in clause 8.3A for L1,max, L2,1,max, L2,2,max, L3,1,max, andL3,2,max | | | | | | | | |

A.13.2.2.1.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in slot *m+*1+

During T2, conditioned on that downlink CCA failures L1 and L2,2 experienced in the SCell fulfill L1 ≤ L1,max and L2,2 ≤ L2,2,max with L1,max = 2 and L2,2,max = 2, respectively, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in slot *m +* (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB + L1\*Trs + 5ms and TCSI\_reporting\_withCCA = TCSI\_reporting + L2,2\*TCSI-RS + TCSI\_ReportingDelay, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB.

During T3, interruption on PCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.13.2.2.2 SCell Activation and Deactivation of known SCell under CCA, 320 ms SCell measurement cycle

A.13.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell on NR-U SCC with CCA are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 320 ms.

The supported test configurations are same as in Table A.13.2.2.1.1-1 above.

The test parameters are same as in Table A.13.2.2.1.1-2 above, except for parameters listed below in Table A.13.2.2.2.1-1. The cell-specific parameters are same as in Table A.13.2.2.1.1-3 above.

The test execution is the same as described in clause A.13.2.2.1 above, except that downlink CCA failures L2,1 and L2,2 with limits L2,1 ≤ L2,1,max and L2,2 ≤ L2,2,max replace L1 as described in clause 8.3A.2 for activation of known SCell with a measurement cycle larger than 160 ms.

**Table A.13.2.2.2.1-1: General test parameters for known SCell activation with SCell under CCA, 320 ms SCell measurement cycle**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| SCell measurement cycle (measCycleSCell) | ms | 320 |  |

A.13.2.2.2.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in slot *m+*1+

During T2, conditioned on that downlink CCA failures L2,1 and L2,2 experienced in the SCell fulfill L2,1 ≤ L2,1,max and L2,2 ≤ L2,2,max with L2,1,max = 2 and L2,2,max = 2, respectively, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in slot *m +* (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB\_MAX + L2,1\*TSMTC\_MAX + (1 +L2,2)\*Trs + 5ms and TCSI\_reporting\_withCCA = TCSI\_reporting + TCSI\_ReportingDelay, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB.

During T3, interruption on PCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.13.2.2.3 SCell Activation and Deactivation of unknown SCell under CCA

A.13.2.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell on NR-U SCC with CCA are within the requirements stated in clause 8.3A, when the SCell is unknown to the UE at the time of activation.

The supported test configurations are same as in Table A.13.2.2.1.1-1 above.

The test parameters are same as in Table A.13.2.2.1.1-2 above, except for parameters listed below in Table A.13.2.2.3.1-1. The cell-specific parameters are same as in Table A.13.2.2.1.1-3 above.

The test execution is the same as described in clause A.13.2.2.1 above, except that downlink CCA failures L3,1 and L3,2 with limits L3,1 ≤ L3,1,max and L3,2 ≤ L3,2,max replace L1 as described in clause 8.3A.2 for activation of unknown SCell.

**Table A.13.2.2.3.1-1: General test parameters for unknown SCell activation with SCell under CCA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| T1 | s | 0.1 | During this time period the PCell shall be known and the SCell configured, but not detected. |

A.13.2.2.3.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in slot *m+*1+

During T2, conditioned on that downlink CCA failures L3,1 and L3,2 experienced in the SCell fulfill L3,1 ≤ L3,1,max and L3,2 ≤ L3,2,max with L3,1,max = 2 and L3,2,max = 2, respectively, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in slot *m +* (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB\_MAX + (1 + L3,1)\*TSMTC\_MAX + (2 + L3,2)\*Trs + 5ms and TCSI\_reporting\_withCCA = TCSI\_reporting + TCSI\_ReportingDelay, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot , as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot *m* +1+ to slot *m* +1+ with TX = TFirstSSB.

During T3, interruption on PCell shall not occur outside slot *n* +1+THARQ/NR\_slot\_length to slot *n*+1+(THARQ +3ms)/NR\_slot\_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

### <End of Change 13>

### <Start of Change 14 (R4-2114104)>

### A.3.1A.3 CORESET for RMC scheduling

#### A.3.1A.3.1 TDD

Table A.3.1A.3.1-1: Control Channel RMC with SCS=30KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CCR.1.1 CCA | CCR.1.2 CCA | CCR.1.3 CCA |  |  |  |  |
| Channel bandwidth | MHz | 40 | 40 | 40 |  |  |  |  |
| Subcarrier spacing | kHz | 30 | 30 | 30 |  |  |  |  |
| Allocated resource blocks for CORESET Note 3 |  | 24 | 24 | 18 |  |  |  |  |
| Number of transmitter antennas |  | 1 | 1 | 1 |  |  |  |  |
| Duration of CORESET | symbols | 2 | 2 | 2 |  |  |  |  |
| REG bundle size |  | 6 | 6 | 6 |  |  |  |  |
| DMRS precoder granularity |  | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size |  |  |  |  |
| CCE to REG mapping |  | Interleaved | Interleaved | Interleaved |  |  |  |  |
| Interleave n\_shift |  | 0 | 0 | 0 |  |  |  |  |
| Interleave size |  | 2 | 2 | 2 |  |  |  |  |
| Beamforming Pre-Coder |  | N/A | N/A | N/A |  |  |  |  |
| Aggregation level | CCE | 4 | 8 | 4 |  |  |  |  |
| DCI formats |  | Note 1 | Note 1 | Note 1 |  |  |  |  |
| Payload size (without CRC) | bits | Note 2 | Note 2 | Note 2 |  |  |  |  |
| Note 1: DCI format shall depend upon the test configuration.  Note 2: Payload size shall depend upon the test configuration.  Note 3: Allocated in the same resource blocks where the associated RMC is scheduled. | | | | | | | | |

### <End of Change 14>

### <Start of Change 15 (R4-2114120)>

### A.10.3.6 PSCell addition and release delay

#### A.10.3.6.1 Addition and Release Delay of known NR PSCell on the carrier under CCA

##### A.10.3.6.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays on the carrier under CCA under EN-DC are within the requirements stated in clause 7.31A.2 [15] for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.10.3.6.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.10.3.6.1.1-2 and cell-specific parameters in A.10.3.6.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 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.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event B1 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event B1. After receiving the Event B1, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T4.

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 T4, 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 T5.

Table A.10.3.6.1.1-1: Supported test configurations for FR1 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD |
| 2 | 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.10.3.6.1.1-2: General Test Parameters for 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 on the carrier under CCA |
| 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 |
| DL CCA model | | Dynamic channel accessNote 1, 3 |  |  | As specified in clause A.3.20.2.1 |
| Semi-static channel access Note 2, 3 |
| UL CCA model | | Dynamic channel access Note 1, 3 |  |  | As specified in clause A.3.20.2.2 |
| Semi-static channel access Note 2,3 |
| Measurement gap pattern Id | | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration on cell2 | | |  | FR1 PRACH configuration 2 | Captured in A.3.8.2.1 |
| CQI/PMI periodicity and offset configuration index on cell2 | | |  | 2ms | CQI reporting for PSCell every uplink subframe |
| 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. |
| T304 | | | ms | 500 |  |
| LCCA\_DL | | |  | 5 |  |
| T1 | | | s | 1 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | | s | ≥ Tidentify\_irat\_cca\_without\_index | Tidentify\_irat\_cca\_without\_index is defined in clause 8.1.2.4.21A and 8.1.2.4.22A in TS 36.133  During this time the UE shall identify neighbour cell (cell2) and report event B1. |
| T3 | | | s | ≥ Tconfig\_PSCell\_withCCA | During this time the UE adds the PSCell. Tconfig\_PSCell\_withCCA  is defined in clause 7.31A.2 |
| T4 | | | s | 0.5 | During this time the UE sends CSI reports for PSCell. |
| T5 | | | s | 0.5 | During this time the UE releases the PSCell. |
| NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | |

Table A.10.3.6.1.1-3: Cell Specific Parameters for PSCell Addition and Release

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | | | |
|  |  |  | T1 | T2 | T3 | T4 | T5 |
| PCCA\_DL for dynamic channel access Note 5,7 | - | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | PCCA\_DL\_1=0.75  PCCA\_DL\_2=0.75 | | | | |
| PCCA\_DL for semi-static channel access Note 6,7 | - | PCCA\_DL=0.9375 | PCCA\_DL=0.9375 | | | | |
| PCCA\_UL for dynamic channel access Note 5,7 | - | 1 | 1 | | | | |
| PCCA\_UL for semi-static channel access Note 6,7 | - | 1 | 1 | | | | |
| E-UTRA RF Channel Number |  | 1,2 | 1 | | | | |
| NR RF Channel Number |  | 1,2 | 2 | | | | |
| TDD configuration |  | 1,2 | TDDConf.1.1 CCA | | | | |
| BWchannel |  | 1,2 | 40: NRB,c = 106 | | | | |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | | | | |
| PDSCH Reference |  | 1,2 | SR1.1 CCA | | | | |
| RMSI CORESET Reference |  | 1,2 | CR1.1 CCA | | | | |
| Dedicated CORESET Reference |  | 1,2 | CCR1.1 CCA | | | | |
| OCNG Patterns |  | 1,2 | OP.1 | | | | |
| DBT window configuration |  | 1, 2 | DBT.1 | | | | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | | | | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | | | | |
| SMTC configuration |  | 1,2 | SMTC.1 | | | | |
| TRS Configuration |  | 1,2 | TRS.1.2 TDD | | | | |
| 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 | 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 | N/A | -85 | | | |
| Note2 | dBm/SCS | 1,2 | N/A | -82 | | | |
|  |  | 1,2 | -infinity | 0 | | | |
|  |  | 1,2 | -infinity | 0 | | | |
| SS-RSRPNote3 | dBm/SCS | 1,2 | -infinity | -82 | | | |
| IoNote3 | dBm/38.1MHz | 1,2 | N/A | -51 | | | |
| Propagation condition |  | 1,2 | 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. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  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.  Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | |

##### A.10.3.6.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest Tconfig\_PSCell\_withCCA Note1 into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest 20 ms into T5.

All the above test requirements shall be fulfilled in order 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 can be expressed as follows as specified in clause 7.31A.2 [15]:

Tconfig\_PSCell\_withCCA = TRRC\_delay + Tprocessing + Tsearch\_withCCA + T∆\_withCCA + TPSCell\_ DU\_withCCA + 2 ms

Where:

TRRC\_delay = 20 ms

Tprocessing = 20 ms

Tsearch\_withCCA = 0

T∆\_withCCA = (1+ L2)\*20 ms

TPSCell\_ DU\_withCCA = 20 ms.

L2 is the number of SMTC occasions not available at the UE for fine time tracking and acquiring full timing information, where L2 ≤ LCCA\_DL.

### <End of Change 15>

### <Start of Change 16 (R4-2114171)>

### A.10.3.2 Interruption

#### A.10.3.2.1 E-UTRAN – NR interruptions during SCell operations with CCA

##### A.10.3.2.1.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during Scell operations on an NR SCC with CCA, This test will verify the interruption requirements for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1 and 8.3A. Supported test configurations are shown in table A.10.3.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.10.3.2.1.1-2 and A.10.3.2.1.1-3 below. The E-UTRAN cell specific test parameters are provided in Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR SCell. Both of cell 2 and cell 3 are subject to CCA. The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the LTE PCell and NR PSCell are continuously scheduled in DL. The power of signals on cell 1,2 and 3 is not modified during the test.

Prior to T1, a connection is started with cell 2 as the PSCell, and measurements of cell 3 are configured with gap pattern 0, such that cell 3 is reported. This ensures that cell 3 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying SCell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the SCell is configured.

The point in time at which the RRC message implying SCell addition is received at the UE antenna connector, defines the start of time period T1.

The point in time at which the MAC-CE message implying SCell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying SCell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying SCell release is received at the UE antenna connector, defines the start of time period T5.

Table A.10.3.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD  NR without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD  NR without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR with CCA: 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.10.3.2.1.1-2: General test parameters for Interruptions during measurements on deactivated NR SCC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is E-UTRAN RF channel and the other two are NR RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on NR RF channel number 3. |
| CP length |  | Normal | Applicable to Cell1, Cell2 and Cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| T1 | s | <10 |  |
| T2 | s | <10 |  |
| T3 | s | <10 |  |
| T4 | s | <10 |  |
| T5 | s | <10 |  |

Table A.10.3.2.1.1-3: NR cell specific test parameters for Interruptions during measurements on deactivated NR SCC

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | | | | | Cell3 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| TDD configuration | Config 1,2 |  | TDDConf.1.1 CCA | | | | | TDDConf.1.1 CCA | | | | |
| BWchannel | Config 1,2 | MHz | 40: NRB,c = 106 | | | | | 40: NRB,c = 106 | | | | |
| DL CCA model | Config 1,2 |  | As specified in clause A.3.20.2.1 | | | | | As specified in clause A.3.20.2.1 | | | | |
| DL CCA probabilityfor semi-static channel accessNote6,8 | PCCA\_DL |  | 0.9375 | | | | | 0.9375 | | | | |
| DL CCA probability for dynamic channel accessNote7,8 | PCCA\_DL\_1 |  | 0.75 | | | | | 0.75 | | | | |
| PCCA\_DL\_2 |  | 0.75 | | | | | 0.75 | | | | |
| UL CCA model | Config 1,2 |  | As specified in clause A.3.20.2.2 | | | | | --- | | | | |
| UL CCA probability for semi-static channel access | PCCA\_UL |  | 0.87 | | | | | --- | | | | |
| UL CCA probability for dynamic channel access | PCCA\_UL |  | 0.75 | | | | | --- | | | | |
| Initial BWP  Configuration | Config 1,2 |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Dedicated DL BWP  Configuration | Config 1,2 |  | DLBWP.1.1 | | | | | DLBWP.1.1 | | | | |
| Initial UL BWP  Configuration | Config 1,2 |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Dedicated UL BWP  Configuration | Config 1,2 |  | ULBWP.1.1 | | | | | ULBWP.1.1 | | | | |
| PDSCH reference meassurement channel | Config 1,2 |  | SR.1.1 CCA | | | | | - | | | | |
| RMSI CORESET  Parameters | Config 1,2 |  | CR.1.1 CCA | | | | | CR.1.1 CCA | | | | |
| PDCCH CORESET  Parameters | Config 1,2 |  | CCR.1.1 CCA | | | | | CCR.1.1 CCA | | | | |
| TRS configuration | Config 1,2 |  | TRS.1.2 TDD | | | | | TRS.1.2 TDD | | | | |
| OCNG Patterns | |  | OP.1 | | | | | OP.1 | | | | |
| SSB configuration for semi-static channel accessNote6,8 | Config 1,2 |  | SSB.1 CCA | | | | | SSB.1 CCA | | | | |
| SSB configuration for dynamic channel accessNote7,8 | Config 1,2 |  | SSB.2 CCA | | | | | SSB.2 CCA | | | | |
| SMTC Configuration | Config 1,2 |  | SMTC.1 | | | | | SMTC.1 | | | | |
| DBT window configuration | Config 1,2 |  | DBT.1 | | | | | DBT.1 | | | | |
| TCI state | |  | TCI.State.0 | | | | | TCI.State.0 | | | | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | | | | 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 | | | | | 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 | | | | | -104 | | | | |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | | | | | -87 | | | | |
| Ês/Iot | | dB | 17 | | | | | 17 | | | | |
| Ês/Noc | | dB | 17 | | | | | 17 | | | | |
| IoNote3 | Config 1,2 | dBm/38.16MHz | -52.86 | | | | | -52.86 | | | | |
| Time offset to Cell1 Note 4 | | ms | 3 | | | | | 3 | | | | |
| Time offset to Cell2 Note 5 | | μs | - | | | | | 3 | | | | |
| 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 in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  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  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | | | | |

##### A.10.3.2.1.2 Test Requirements

The UE shall meet the interruption requirements for SCell addition on both the victim PSCC in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T1

The UE shall meet the interruption requirements for SCell activation on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T2. There shall be a single interruption with time window as specified in clause 8.3A.2

The UE shall meet the interruption requirements for SCell deactivation on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T3. There shall be a single interruption with time window as specified in clause 8.3A,3

The UE shall meet the interruption requirements for deactivated SCell measurements on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T43. The interruptions shall be within the time window as specified in clause 8.3A,3

The UE shall meet the interruption requirements for SCell release on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T5.

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

A.11.4.2 Interruption

A.11.4.2.1 NR interruptions during Scell operations with CCA on PCell and SCell

A.11.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify NR PCell interruptions during Scell operations on an NR SCC with CCA. This test will verify the interruption requirements for NR PCell in NR SA specified in TS 38.133 clause 8.2.2 and 8.3A. Supported test configurations are shown in table A.11.4.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.11.4.2.1.1-2 and A.11.4.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 and Cell2 are PCell and SCell. Both of cell 1 and cell 2 are subject to CCA. The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the PCell are continuously scheduled in DL. The power of signals on cell 1 and 2 is not modified during the test.

Prior to T1, a connection is started with cell 1 as the PCell, and measurements of cell 2 are configured with gap pattern 0, such that cell 2 is reported. This ensures that cell 2 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying Scell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the Scell is configured.

The point in time at which the MAC-CE message implying Scell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying Scell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying Scell release is received at the UE antenna connector, defines the start of time period T5.

**Table A.11.4.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

**Table A.11.4.2.1.1-2: General test parameters for Interruptions during measurements on deactivated NR SCC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1, 2 |  |
| Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Configured SCell |  | Cell2 | Deactivated SCell 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 | 160 |  |
| T1 | s | <10 |  |
| T2 | s | <10 |  |
| T3 | s | <10 |  |
| T4 | s | <10 |  |
| T5 | s | <10 |  |

**Table A.11.4.2.1.1-3: NR cell specific test parameters for Interruptions during measurements on deactivated NR SCC**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell1** | | | | | **Cell2** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** | **T1** | **T2** | **T3** | **T4** | **T5** |
| TDD configuration | Config 1 |  | TDDConf.1.1 CCA | | | | | TDDConf.1.1 CCA | | | | |
| BWchannel | Config 1 | MHz | 40: NRB,c = 106 | | | | | 40: NRB,c = 106 | | | | |
| DL CCA model | Config 1 |  | As specified in clause A.3.20.2.1 | | | | | As specified in clause A.3.20.2.1 | | | | |
| DL CCA probabilityfor semi-static channel accessNote6,8 | PCCA\_DL |  | 0.9375 | | | | | 0.9375 | | | | |
| DL CCA probability for dynamic channel accessNote7,8 | PCCA\_DL\_1 |  | 0.75 | | | | | 0.75 | | | | |
| PCCA\_DL\_2 |  | 0.75 | | | | | 0.75 | | | | |
| UL CCA model | Config 1 |  | As specified in clause A.3.20.2.2 | | | | | --- | | | | |
| UL CCA probability for semi-static channel access | PCCA\_UL |  | 0.87 | | | | | --- | | | | |
| UL CCA probability for dynamic channel access | PCCA\_UL |  | 0.75 | | | | | --- | | | | |
| Initial BWP  Configuration | Config 1 |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Dedicated DL BWP  Configuration | Config 1 |  | DLBWP.1.1 | | | | | DLBWP.1.1 | | | | |
| Initial UL BWP  Configuration | Config 1 |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Dedicated UL BWP  Configuration | Config 1 |  | ULBWP.1.1 | | | | | ULBWP.1.1 | | | | |
| PDSCH reference meassurement channel | Config 1 |  | SR.1.1 CCA | | | | | --- | | | | |
| RMSI CORESET  parameters | Config 1 |  | CR.1.1 CCA | | | | | CR.1.1 CCA | | | | |
| PDCCH CORESET  parameters | Config 1 |  | CCR.1.1 CCA | | | | | CCR.1.1 CCA | | | | |
| TRS configuration | Config 1 |  | TRS.1.2 TDD | | | | | TRS.1.2 TDD | | | | |
| OCNG Patterns | |  | OP.1 | | | | | OP.1 | | | | |
| SSB configuration for semi-static channel accessNote6,8 | Config 1 |  | SSB.1 CCA | | | | | SSB.1 CCA | | | | |
| SSB configuration for dynamic channel accessNote7,8 | Config 1 |  | SSB.2 CCA | | | | | SSB.2 CCA | | | | |
| SMTC Configuration | Config 1 |  | SMTC.1 | | | | | SMTC.1 | | | | |
| DBT window configuration | Config 1 |  | DBT.1 | | | | | DBT.1 | | | | |
| TCI state | |  | TCI.State.0 | | | | | TCI.State.0 | | | | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | | | | 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 | | | | | 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 | | | | | -104 | | | | |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | | | | | -87 | | | | |
| Ês/Iot | | dB | 17 | | | | | 17 | | | | |
| Ês/Noc | | dB | 17 | | | | | 17 | | | | |
| IoNote3 | Config 1 | dBm/38.16MHz | -52.86 | | | | | -52.86 | | | | |
| Time offset to Cell1 Note 4 | | ms | 3 | | | | | 3 | | | | |
| Time offset to Cell2 Note 5 | | μs | - | | | | | 3 | | | | |
| Propagation Condition | |  | AWGN | | | | | AWGN | | | | |
| Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  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  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | | | | |

A.11.4.2.1.2 Test Requirements

The UE shall meet the interruption requirements for Scell addition on the victim Pcell in clause 8.2.1 during time T1

The UE shall meet the interruption requirements for Scell activation on the victim Pcell in clause 8.2.1during time T2. There shall be a single interruption with time window as specified in clause 8.3A.2

The UE shall meet the interruption requirements for Scell deactivation on the victim PCell in clause 8.2.1during time T3. There shall be a single interruption with time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for deactivated Scell measurements on the victim PCell in clause 8.2.1 during time T4. The interruptions shall be within the time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for Scell release on the victim PCell in clause 8.2.1 during time T5.

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

A.13.2.1 Interruption

A.13.2.1.1 NR interruptions during SCell operations with CCA on SCell

A.13.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify NR PCell interruptions during SCell operations on an NR SCC with CCA, This test will verify the interruption requirements for NR PCell in NR SA specified in TS 38.133 clause 8.2.2 and 8.3A. Supported test configurations are shown in table A.13.2.1.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.13.2.1.1.1-2 and A.13.2.1.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 and Cell2 are PCell and SCell. Cell 1 is on a licenced band and cell 2 is subject to CCA. The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the PCell are continuously scheduled in DL. The power of signals on cell 1 and 2 is not modified during the test.

Prior to T1, a connection is started with cell 1 as the PCell, and measurements of cell 2 are configured with gap pattern 0, such that cell 2 is reported. This ensures that cell 2 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying Scell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the Scell is configured.

The point in time at which the MAC-CE message implying Scell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying Scell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying Scell release is received at the UE antenna connector, defines the start of time period T5.

**Table A.13.2.1.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 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.13.2.1.1.1-2: General test parameters for Interruptions during measurements on deactivated NR SCC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1, 2 |  |
| Active PCell |  | Cell1 | PCell on NR RF channel number 1. |
| Configured dSCell |  | Cell2 | SCell 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 | 160 |  |
| T1 | s | <10 |  |
| T2 | s | <10 |  |
| T3 | s | <10 |  |
| T4 | s | <10 |  |
| T5 | s | <10 |  |

**Table A.13.2.1.1.1-3: NR cell specific test parameters for Interruptions during measurements on deactivated NR SCC**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell1** | | | | | **Cell2** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** | **T1** | **T2** | **T3** | **T4** | **T5** |
| TDD configuration | Config 1 |  | --- | | | | | TDDConf.1.1 CCA | | | | |
| Config 2 | TDDConf.1.1 | | | | |
| Config 3 | TDDConf.2.1 | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | | 40: NRB,c = 106 | | | | |
| Config 3 | 40: NRB,c = 106 | | | | |
| DL CCA model | Config 1,2,3 |  | --- | | | | | As specified in clause A.3.20.2.1 | | | | |
| DL CCA probability for semi-static channel accessNote6,8 | PCCA\_DL |  | --- | | | | | 0.9375 | | | | |
| DL CCA probability for dynamic channel accessNote7,8 | PCCA\_DL\_1 |  | --- | | | | | 0.75 | | | | |
| PCCA\_DL\_2 |  | --- | | | | | 0.75 | | | | |
| Initial BWP  Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Dedicated DL BWP  Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | DLBWP.1.1 | | | | |
| Initial UL BWP  Configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Dedicated UL BWP  Configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | ULBWP.1.1 | | | | |
| PDSCH reference meassurement 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 | | | | |
| PDCCH CORESET  Parameters | Config 1 |  | CCR.1.1 FDD | | | | | --- | | | | |
| Config 2 |  | CCR.1.1 TDD | | | | |
| Config 3 |  | CCR.2.1 TDD | | | | |
| TRS configuration | Config 1 |  | TRS.1.1 FDD | | | | | --- | | | | |
| Config 2 |  | TRS.1.1 TDD | | | | |
| Config 3 |  | TRS.1.2 TDD | | | | |
| OCNG Pattern | |  | OP.1 | | | | | OP.1 | | | | |
| SSB configuration for semi-static channel accessNote6,8 | Config 1,2 |  | SSB.1 FR1 | | | | | SSB.1 CCA | | | | |
| Config 3 |  | SSB.2 FR1 | | | | |
| SSB configuration for dynamic channel accessNote7,8 | Config 1,2 |  | SSB.1 FR1 | | | | | SSB.2 CCA | | | | |
| Config 3 |  | SSB.2 FR1 | | | | |
| SMTC Configuration | Config 1,2,3 |  | SMTC.1 | | | | | SMTC.1 | | | | |
| DBT window configuration | Config 1,2,3 |  | --- | | | | | DBT.1 | | | | |
| TCI state | |  | TCI.State.0 | | | | | --- | | | | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | | | | 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 | | | | | 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 1,2,3 | dBm/15 kHz | -104 | | | | | -104 | | | | |
| NocNote 2 | Config 1,2 | dBm/SCS | -104 | | | | | -101 | | | | |
| Config 3 | -101 | | | | |
| SS-RSRP Note 3 | Config 1,2,3 | dBm/15 kHz | -87 | | | | | -87 | | | | |
| Ês/Iot | | dB | 17 | | | | | 17 | | | | |
| Ês/Noc | | dB | 17 | | | | | 17 | | | | |
| 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. For Cell 2 with CCA model, OCNG is transmitted only in slots with downlink transmission bursts and is not transmitted during muted slots or during DBT windows.  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  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. | | | | | | | | | | | | |

A.13.2.1.1.2 Test Requirements

The UE shall meet the interruption requirements for SCell addition on the victim Pcell in clause 8.2.1 during time T1

The UE shall meet the interruption requirements for SCell activation on the victim Pcell in clause 8.2.1during time T2. There shall be a single interruption with time window as specified in clause 8.3A.2

The UE shall meet the interruption requirements for SCell deactivation on the victim PCell in clause 8.2.1during time T3. There shall be a single interruption with time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for deactivated SCell measurements on the victim PCell in clause 8.2.1 during time T4. The interruptions shall be within the time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for SCell release on the victim PCell in clause 8.2.1during time T5.

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

### <End of Change 16>