**3GPP TSG-RAN4 Meeting #100-e *R4-2120429***

**Electronic Meeting, 1st Nov– 12th Nov 2021**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** |  | **rev** | **-** | **Current version:** | **17.3.0** |  |
|  | | | | | | | | |
| *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\_newRAT-Perf maintenance (Rel-17) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MCC, Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Perf | | | | |  | ***Date:*** | | | 2021-11-15 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This big CRs merge the mutiple endorsed draft CRs. The reason for change in each endorsed draft CR is copied below.   * R4-2117721 Draft CR to TS 38.133 on test cases of NE-DC active BWP switch   <Reason for change>  Core requirements of interruption at active BWP switching was introduced for NE-DC in Rel-15. But the corresponding test cases are missing.  In RAN4#90 meeting, the test case list for NE-DC was discussed and the agreement are provided as follows:  Agreement: the test list is as follows for NE-DC   |  |  | | --- | --- | | **Test case number** | **Test purpose** | | **53** | SA SFTD delay under NE-DC | | **54** | SFTD measurement accuracy for NE-DC | | **55** | LTE PSCell addition delay | | **56** | Interruptions on NR CCs due to LTE PSCell addition | | **57** | Interruptions on LTE CCs due to NR BWP switch |  * R4-2117734 CR for test configuration correction of CSI-RS reference measurement channel for TDD SCS=120kHz   <Reason for change>  The nrofPorts configuration of CSI-RS reference measurement channel CSR-RS.3.1 TDD is uncorrect.   * R4-2117781 Draft CR to TS 38.133: NR\_newRAT-Perf maintenance (Rel-17)   <Reason for change>   1. a) CORESET for RMC of 15kHz configs (CCR.1.1 TDD/FDD: 24 RBs are allocated for CORESET) are incompatible in some test frequencies: offset between active BWP and point A is not multiple of 6RBs on several test frequencies defined in 38.508-1; there is a case where the 24RB CORESET cannot be completely contained in active DL BWP (DLBWP.1.3: 25RBs).   For example, band n41 15kHz mid range defined in TS38.508-1 Table 4.3.1.1.1.41-1:    SSB is 106RBs+7subcarriers away from point A, and the start position of active DL BWP (DLBWP.1.3) should be 106RBs away from point A according to Table A.3.9.2.2-1 Note 2:    As in figure below, 24RB CORESET cannot be completely contained in active DL BWP (DLBWP.1.3).    Thus there is a need to correct the allocated RBs for CORESET: 24RBs 🡪 18RBs.  b) For CORESET for RMC setting of both FDD and TDD configs, aggregation level(=4) does not allow 2 DCIs per 1 slot. Thus simultaneous scheduling of PDSCH/PUSCH is unviable. In a case that the standalone UE needs to transmit PUSCH (such as RRCReconfigurationComplete), simultaneous scheduling of PDSCH/ PUSCH is mandatory.  Thus there is a need to correct aggregation level to enable sending of 2 DCIs in 1 slot: aggregation level = 4 🡪 2.  c) Editorial error at A.4.5.6.2.1.2. Same texts appear twice.   1. a) A discription of test requirement value in A.8.3.1.1.2 is inconsistent.   The transmission timing of PRACH is specified as 85 ms in the test requirement while in the note the corresponding delay is shown as 112 ms. It is also not aligned with the description in Rel-15 spec, which is unified by 112 ms.  b) The referrence of RRC procedure delay is incorrect.   1. a) PRACH configuration needs to be corrected at A.4.5.7.1 since A.4.5.7.1 Addition and Release Delay of known NR PSCell test does not use CFRA (Contention Free RACH).   b) Extension of T2 duration is necessary to give UE allowance for Measurement Report transmission as well as RRC Reconfiguration for Gap Release.  c) Following test requirement is vaguely written.  “The UE shall transmit the PRACH to PSCell at latest 82 msNote1 into T3.”  “The UE shall stop sending CSI reports for PSCell in at latest 20ms into T5.”   1. Initial DL and UL BWP configuration in Table A.6.3.2.1.2.1-3 are not correctly specified with other similar re-establishment test cases. 2. Following parameters are missing in A.4.5.5.3/4/5/6.   ・BW channel  ・DL initial BWP configuration  ・DL dedicated BWP configuration  ・UL initial BWP configuration  ・UL dedicated BWP configuration   1. Propagation conditions were updated to incorrect settings by R4-2111873 in RAN4#100. (Only Rel-17 CR had incorrect chages.)   Intended correction was originally from ETU70 to TDL-C 300ns 100Hz in Table A.8.4.2.1.1-**4**, A.8.4.2.2.1-**4**, A.8.4.2.3.1-**4** and A.8.4.2.4.1-**4**. But in the previous Rel-17 CR, the changes were made in Table A.8.4.2.1.1-**3**, A.8.4.2.2.1-**3**, A.8.4.2.3.1-**3** and A.8.4.2.4.1-**3** which are for E-UTRA.   * R4-2118075 Test cases for SFTD measurement accuracy under NE-DC   <Reason for change>  SFTD measurement accuracy test cases under NE-DC are missing   * R4-2118789 Correction to interruption test cases\_R17   <Reason for change>  **CAT A CR of R4-2120252**   1. Cell offset between NR PSCell and E-UTRA PCell in FR1 EN-DC interruption TCs are chosen to be 33us for sync EN-DC TCs (A.4.5.2.1/3/5) and 500us for async EN-DC TCs (A.4.5.2.2/4/6). However,  * 33us is the MRTD requirement for inter-band sync EN-DC. For intra-band sync EN-DC, MRTD shall be 3us. So using 33us requirements means conformant UE may fail the test in intra-band EN-DC case. * NR slot length is just 500 us for 30kHz SCS. So a cell offset of 500us means LTE subframe boundaries and NR slot boundarys are exactly aligned. It's actually a sync EN-DC scenario. Then the TCs become meaningless for 30kHz test configuration.   We purpose to use 3us/33us for FR1 sync EN-DC TCs and 125/250us for FR1 async EN-DC TCs. Similar issue also exists in FR2 async EN-DC interruption TCs. We suggest use 62.5us for them.   1. Interruption requirements for measurement on deactivated E-UTRA SCell should be Y3 slot + SMTC duration according to 38.133 cl.8.2.1.2.5:  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | When one E-UTRA SCell in MCG is deactivated, the UE is allowed due to measurements on the E-UTRA SCC with the deactivated E-UTRA SCell:  - an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCellsis 640 ms or longer.  - an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [15]for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [15].  Each interruption shall not exceed  - X3 slot, if the PSCell or activated SCell is not in the same band as the E-UTRA deactivated SCC being measured, or  - Y3 slot + SMTC duration, if the PSCell or activated SCell is in the same band as the E-UTRA deactivated SCC being measured, provided the cell specific reference signals from the PSCell or activated SCell and the E-UTRA deactivated SCC being measured are available in the same slot.  Table 8.2.1.2.5.2-1: Interruption length X3 and Y3 at measurements on deactivated E-UTRA SCC   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | NR Slot length (ms) | Interruption length X3 (slots) | | Interruption length Y3 (slots) | | | Sync | Async | Sync | Async | | 0 | 1 | 1 | 2 | 1 | 2 | | 1 | 0.5 | 1 | 2 | 1 | 2 | | 2 | 0.25 | 3 | | 2 | 3 | | 3 | 0.125 | 5 | | N/A | N/A | |   However, SMTC duration is forgotten in test requirements for intra-band cases in A.4.5.2.5.  Furthermore, UE is only allowed to cause one interruption rather than two.   * R4-2119241 Test case for LTE PSCell addition in NE-DC (R17)   <Reason for change>  In RAN4#90, RAN4 agreed to introduce several NE-DC RRM test cases in R15. However, these test cases are somehow still missing in current specification. One of the test is to verify E-UTRAN PSCell addition delay and corresponding interruption requirements.   * R4-2119261 Draft CR to TS 38.133: Corrections to radio link monitoring test cases (Rel 17)   <Reason for change>   1. RLM TC A.6.5.1.3 mentions in the test purpuse the configuration of Gap Pattern ID#0, while the common parameters table defines “Gap pattern ID N.A.” and there is no further definition in the gap. Since also the respective TCs A.4/5/7.5.1.3 do not have a meas gap configures, this seems to be a typo (Cope-Paste error) and needs to be deleted. 2. In out-of-sync test cases, the CORESET aggregation level defined in the common test parameter is 8, and is conflictig with the one of the used CCRs = 4. The CCR needs to be corrected to the CCR RMC with AL 8. 3. There is no consitistent CORESET CR and CCR configuration among the RLM TCs. Some are missing the CRs, while some others the CCRs.  * R4-2119573 Rel-17 Cat-A CR to RMC CORESET reference channel for test cases A.5.3.2.2.x   <Reason for change>  In the test cases, RMC CORESET for Msg2 and Msg4 is missing. As a consequence, the RMC CORESET ends up using a default aggregation level defined in 38.508-1. The default aggregation level is 2 which may result in Msg2 and Msg4 detection performance degradation during the tests.   * R4-2118113 CR for RRC Re-establishment test case in R17   <Reason for change>  T2 = evaluation period for OOS + T310 + margin for turning off transmitter defined in clause 8.1.5 in TS 38.133.  The calculations are provided as follows:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Section | Evaluation time  for OOS | T310 | Time for turning off transmitter  (clause 8.1.5 in 38.133) | T2 | | A.6.3.2.1.1 | 200 ms | 0 | 40 ms | 240 ms | | A.6.3.2.1.2 | 200 ms | 0 | 40 ms | 240 ms | | A.6.3.2.1.3 | 200 ms | 6 s | 40 ms | 6.24 s | | A.7.3.2.1.1 | 4.8 s | 0 | 40 ms | 4.84 s | | A.7.3.2.1.2 | 4.8 s | 0 | 40 ms | 4.84 s | | A.7.3.2.1.3 | 4.8 s | 6 s | 40 ms | 10.84 s |   The test case A.7.3.2.1.1 is the case of “FR2 without known target cell” and the serving cell SSB Ês/Iot is smaller than -8. According to Table 6.2.1.2.1-1 in TS 38.133, the Tidentify\_intra\_NR should 3520.  Table 6.2.1.2.1-1: Time to identify target NR cell for RRC connection re-establishment to NR intra-frequency cell   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Serving cell | FR of target NR | Tidentify\_intra\_NR [ms] | | | | SSB Ês/Iot (dB) | cell | Known NR cell | Unknown NR cell | | ≥ -8 | FR1 | MAX (200 ms, 5 x TSMTC) | MAX (800 ms, 10 x TSMTC) | | ≥ -8 | FR2 | N/A | MAX (1000 ms, 80 x TSMTC)) | | < -8 | FR1 | N/A | 800Note1 | | < -8 | FR2 | N/A | 3520Note1 | | Note 1: The UE is not required to successfullyidentify a cell on any NR frequency layer when TSMTC > 20 ms and serving cell SSB Ês/Iot < -8 dB. | | | | | | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The summary of change in each endorsed draft CR is copied below.   * R4-2117721 Draft CR to TS 38.133 on test cases of NE-DC active BWP switch   <Summary of change>  1. Introduction of applicability rule  2. Introduction of NE-DC test setup  3. Introduction of test cases for active BWP switch for NE-DC   * R4-2117733 CR for test configuration correction of CSI-RS reference measurement channel for TDD SCS=120kHz   <Summary of change>  For the nrofPorts configuration of CSI-RS reference measurement channel CSR-RS.3.1 TDD, which corresponding to Table A.3.14.2-3 in sub-clause A.3.14.2 in 38.133- h30   * Modify the nrofPorts configuration from 1 to 2 for CSI-RS.3.1 TDD reference measurement channel. * R4-2117781 Draft CR to TS 38.133: NR\_newRAT-Perf maintenance (Rel-16)   <Summary of change>   1. a) Updated CORESET for RMC setting of 15kHz configs:   ·CCR.1.1 FDD/TDD 🡪 CCR.1.2 FDD/TDD  b) Added new CORESET for RMC config for TDD SCS30kHz:  ·CCR.2.4 TDD: 18RB CORESET, AG level=2  Updated CORESET for RMC setting of TDD 30kHz config:  ·CCR.2.3 TDD 🡪 CCR.2.4 TDD  c) Redundant text is removed.   1. a) Corrected the transmission timing of PRACH from 85 ms to 112 ms in A.8.3.1.1.2.   b) Corrected typo of 36.331 to 36.133.   1. a) Changed FR1 PRACH configuration 2 🡪 1 in Table A.4.5.7.1.1-2.   b) Change T2 value 1s🡪1.5s  c) Rephrased the description for the test requirements.   1. Aligned initial DL and UL BWP configuration with other re-establishment cases (e.g. A.6.3.2.1.1)  DLBWP.0🡪DLBWP.0.1  ULBWP.0🡪ULBWP.0.1 2. Added missing parameters based on similar TCs A.4.5.5.1 and 4.5.5.2. 3. For E-UTRA parameters, the previous changes are rolled back from NR propagation condition to LTE propagation condition. (Table A.8.4.2.1.1-3, A.8.4.2.2.1-3, A.8.4.2.3.1-3, A.8.4.2.4.1-3)   For NR parameters, corrected from LTE propagation condition to NR propagation condition. (Table A.8.4.2.1.1-4, A.8.4.2.2.1-4, A.8.4.2.3.1-4, A.8.4.2.4.1-3)   * R4-2118075 Test cases for SFTD measurement accuracy under NE-DC   <Summary of change>  Add the test cases for NE-DC SFTD measurement delay requirements, which correspond to the core requirements specified in TS 38.133 clause 10.1.21.1.   * R4-2111847 R4-2118789 Correction to interruption test cases\_R17   <Summary of change>   1. Cell offset between NR PSCell and E-UTRA PCell in FR1 EN-DC interruption TCs are changed to be:    1. 3us for intra-band sync EN-DC TCs    2. 33us for inter-band sync EN-DC TCs    3. 500us for 15kHz SCS test configuration of async EN-DC TCs    4. 250us for 30kHz SCS test configuration of async EN-DC TCs 2. Cell offset between NR PSCell and E-UTRA PCell in FR2 EN-DC interruption TCs are changed to be 62.5us for async EN-DC TCs. 3. Correct several typos. 4. Test requirements for A.4.5.2.5 and A.4.5.2.6 are corrected.  * R4-2119241 Test case for LTE PSCell addition in NE-DC (R17)   <Summary of change>  Introduce test case for E-UTRAN PSCell addition and release in NE-DC   * R4-2119261 Draft CR to TS 38.133: Corrections to radio link monitoring test cases (Rel 17)   <Summary of change>   1. The configuration of Gap Patter removed from the test purpose section of TC A.6.5.1.3. 2. CORESET CCR in Out-of-Sync test cases adopted to comply with the aggregation level of 8 defined in the test case.(Example CCR 3.1🡪3.4) 3. CORESET CR and CCR added where missing (CCRs to comply with required AL: 4 for In-Sync and 8 for Out-of-Sync)  * R4-2119573 Rel-17 Cat-A CR to RMC CORESET reference channel for test cases A.5.3.2.2.x   <Summary of change>  Added “Dedicated CORESET Reference Channel” to the test configuration tables.   * R4-2118113 CR for RRC Re-establishment test case in R16   <Summary of change>  In A.6.3.2.1.1, A.6.3.2.1.2, A.6.3.2.1.3, A.7.3.2.1.1, A.7.3.2.1.2 and A.7.3.2.1.3, for the comment of the T2, a clarification “Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133” is added.  Change the value of T2 as following:   * + A.6.3.2.1.1 and A.6.3.2.1.2: 240 ms   + A.6.3.2.1.3: 6.24 s   + A.7.3.2.1.1 and A.7.3.2.1.2: 4.84 s   + A.7.3.2.1.3” 10.84 s   In Table A.7.3.2.1.1.1-2, T3 is changed from 3 to 5 (s).  In A.7.3.2.1.1.2, Tidentify\_intra\_NR is changed from 1600 to 3520 ms and the total time is changed from 3 to 5 (s)  In Table A.7.3.2.1.2.1-2, add the missing “SMTC configuration”.  In Table A.7.3.2.1.3.1-3, add the missing“PDSCH RMC configuration”.. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are coppied below.   * R4-2117721 Draft CR to TS 38.133 on test cases of NE-DC active BWP switch   <Consequences if not approved>  The active BWP switch for NE-DC cannot be tested.   * R4-2117733 CR for test configuration correction of CSI-RS reference measurement channel for TDD SCS=120kHz   <Consequences if not approved>  In CSI-RS.3.1 TDD reference measurement channel test configuration, the nrofPorts is uncorrect. For FD-CDM2 cdm-Type, the nrofPorts should not be 1.   * R4-2117781 Draft CR to TS 38.133: NR\_newRAT-Perf maintenance (Rel-17)   <Consequences if not approved>   1. Active BWP switch conformance Test cannot be correctly performed 2. Inconsistency of the PRACH timing remains in A.8.3.1.1.2. 3. Addition and Release Delay Test cannot be correctly performed. 4. Incorrect test parameters remain in the spec. 5. BFD test case cannot be implemented correctly.  * R4-2118075 Test cases for SFTD measurement accuracy under NE-DC   <Consequences if not approved>  No test case is applied to NE-DC measurement accuracy requirements.   * R4-2118789 Correction to interruption test cases\_R17   < Consequences if not approved >  Conformant UE may fail the test   * R4-2119241 Test case for LTE PSCell addition in NE-DC (R17)   <Consequences if not approved>  Test case for E-UTRAN PSCell addition and release in NE-DC would still be missing   * R4-2119261 Draft CR to TS 38.133: Corrections to radio link monitoring test cases (Rel 17)   <Consequences if not approved>  Ambiguous specification will allow different test case implementations.   * R4-2119573 Rel-17 Cat-A CR to RMC CORESET reference channel for test cases A.5.3.2.2.x   <Consequences if not approved>  UE might not be able to meet the requirement due to an unnecessarily low aggregation level.   * R4-2118113 CR for RRC Re-establishment test case in R16   <Consequences if not approved>  Incorrect test cell configuration. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | * R4-2117721 Draft CR to TS 38.133 on test cases of NE-DC active BWP switch   <clauses affected>  New section A.3.13B, A.3A.7, A.4A   * R4-2117733 CR for test configuration correction of CSI-RS reference measurement channel for TDD SCS=120kHz   <clauses affected>  A.3.14.2   * R4-2117780 Draft CR to TS 38.133: NR\_newRAT-Perf maintenance (Rel-17)   <clauses affected>   1. A.3.1.3, A.4.5.6.1.1, A.4.5.6.1.2, A.4.5.6.2.1, A.6.5.6.1.1, A.6.5.6.1.2, A.6.5.6.2.1 2. A.8.3.1.1.2 3. A.4.5.7.1.1 4. A.6.3.2.1.2.1 5. A.4.5.5.3, A.4.5.5.4, A.4.5.5.5, A.4.5.5.6 6. A.8.4.2.1.1, A.8.4.2.2.1, A.8.4.2.3.1, A.8.4.2.4.1   **Isolated impact analysis:**  No change to UE requirements, changes test parameters only.   * R4-2118075 Test cases for SFTD measurement accuracy under NE-DC   <Clauses affected>  New clause A.4A.Y   * R4-2118789 Correction to interruption test cases\_R16   <Clauses affected>  A.4.5.2, A.5.5.2   * R4-2119241 Test case for LTE PSCell addition in NE-DC (R17)   <Clauses affected>  New section A.4A.x   * R4-2119261 Draft CR to TS 38.133: Corrections to radio link monitoring test cases (Rel 17)   <Clauses affected>  A.4.5.1, A.5.5.1, A.6.5.1, A.7.5.1   * R4-2119573 Rel-17 Cat-A CR to RMC CORESET reference channel for test cases A.5.3.2.2.x   <Clauses affected>  A.5.3.2.2   * R4-2118113 CR for RRC Re-establishment test case in R16   <Clauses affected>  A.6.3.2.1.1, A.6.3.2.1.2, A.6.3.2.1.3, A.7.3.2.1.1, A.7.3.2.1.2 and A.7.3.2.1.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<<Unchanged sections skipped>>

<<Start of change>>

### A.3.1.3 CORESET for RMC scheduling

#### A.3.1.3.1 FDD

Table A.3.1.3.1-1: Control Channel RMC for FDD with SCS=15KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CCR.1.1 FDD | CCR.1.2 FDD | CCR.1.3 FDD | CCR.1.4 FDD | CCR.1.5 FDD |  |  |
| Channel bandwidth | MHz | Defined in test case | Defined in test case | Defined in test case | Defined in test case | Defined in test case |  |  |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 | 15 |  |  |
| Allocated resource blocks for CORESET Note 3 |  | 24 | 18 | 24 | 18 | 24 |  |  |
| Number of transmitter antennas |  | 1 | 1 | 1 | 1 | 1 |  |  |
| Duration of CORESET | symbols | 2 | 2 | 2 | 2 | 2 |  |  |
| REG bundle size |  | 6 | 6 | 6 | 6 | 0011000  0000000 |  |  |
| monitoringSymbolsWithinSlot |  | 1100000  0000000 | 1100000  0000000 | 1100000  0000000 | 1100000  0000000 | 6 |  |  |
| DMRS precoder granularity |  | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size |  |  |
| CCE to REG mapping |  | Interleaved | Interleaved | Interleaved | Interleaved | Interleaved |  |  |
| Interleave n\_shift |  | 0 | 0 | 0 | 0 | 0 |  |  |
| Interleave size |  | 2 | 2 | 2 | 2 | 2 |  |  |
| Beamforming Pre-Coder |  | N/A | N/A | N/A | N/A | N/A |  |  |
| Aggregation level | CCE | 4 | 2 | 8 | 4 | 4 |  |  |
| DCI formats |  | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 |  |  |
| Payload size (without CRC) | bits | Note 2 | Note 2 | 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 resource blocks where the associated RMC is scheduled. | | | | | | | | |

#### A.3.1.3.2 TDD

Table A.3.1.3.2-1: Control Channel RMC for TDD with SCS=15KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CCR.1.1 TDD | CCR.1.2 TDD | CCR.1.3 TDD | CCR.1.4 TDD | CCR.1.5 TDD |  |  |
| Channel bandwidth | MHz | Defined in test case | Defined in test case | Defined in test case | Defined in test case | Defined in test case |  |  |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 | 15 |  |  |
| Allocated resource blocks for CORESET Note 3 |  | 24 | 18 | 24 | 18 | 18 |  |  |
| Number of transmitter antennas |  | 1 | 1 | 1 | 1 | 1 |  |  |
| Duration of CORESET | symbols | 2 | 2 | 2 | 2 | 2 |  |  |
| monitoringSymbolsWithinSlot |  | 1100000  0000000 | 1100000  0000000 | 1100000  0000000 | 1100000  0000000 | 0011000  0000000 |  |  |
| REG bundle size |  | 6 | 6 | 6 | 6 | 6 |  |  |
| DMRS precoder granularity |  | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size |  |  |
| CCE to REG mapping |  | Interleaved | Interleaved | Interleaved | Interleaved | Interleaved |  |  |
| Interleave n\_shift |  | 0 | 0 | 0 | 0 | 0 |  |  |
| Interleave size |  | 2 | 2 | 2 | 2 | 2 |  |  |
| Beamforming Pre-Coder |  | N/A | N/A | N/A | N/A | N/A |  |  |
| Aggregation level | CCE | 4 | 2 | 8 | 4 | 4 |  |  |
| DCI formats |  | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 |  |  |
| Payload size (without CRC) | bits | Note 2 | Note 2 | 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 resource blocks where the associated RMC is scheduled. | | | | | | | | |

Table A.3.1.3.2-2: Control Channel RMC for TDD with SCS=30KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CCR.2.1 TDD | CCR.2.2 TDD | CCR.2.3 TDD | CCR.2.4 TDD |  |  |  |
| Channel bandwidth | MHz | Defined in test case | Defined in test case | Defined in test case | Defined in test case |  |  |  |
| Subcarrier spacing | kHz | 30 | 30 | 30 | 30 |  |  |  |
| Allocated resource blocks for CORESET Note 3 |  | 24 | 24 | 18 | 18 |  |  |  |
| Number of transmitter antennas |  | 1 | 1 | 1 | 1 |  |  |  |
| Duration of CORESET | symbols | 2 | 2 | 2 | 2 |  |  |  |
| REG bundle size |  | 6 | 6 | 6 | 6 |  |  |  |
| DMRS precoder granularity |  | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size |  |  |  |
| CCE to REG mapping |  | Interleaved | Interleaved | Interleaved | Interleaved |  |  |  |
| Interleave n\_shift |  | 0 | 0 | 0 | 0 |  |  |  |
| Interleave size |  | 2 | 2 | 2 | 2 |  |  |  |
| Beamforming Pre-Coder |  | N/A | N/A | N/A | N/A |  |  |  |
| Aggregation level | CCE | 4 | 8 | 4 | 2 |  |  |  |
| DCI formats |  | Note 1 | Note 1 | Note 1 | Note 1 |  |  |  |
| Payload size (without CRC) | bits | Note 2 | 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. | | | | | | | | |

Table A.3.1.3.2-3: Control Channel RMC for TDD with SCS=120KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CCR.3.1 TDD | CCR.3.2 TDD | CCR.3.3 TDD | CCR.3.4 TDD | CCR.3.5 TDD | CCR.3.6 TDD | CCR.3.7 TDD |
| Channel bandwidth | MHz | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Subcarrier spacing | kHz | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| Allocated resource blocks for CORESET Note 3 |  | 24 | 24 | 24 | 24 | 24 | 24 | 48 |
| Number of transmitter antennas |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| monitoringSlotPeriodicityAndOffset |  | sl160  0 | sl160  0 | sl160  80 | sl160  0 | sl160  0 | sl160  80 | sl160  0 |
| monitoringSlotPeriodicityAndOffset Note 4 |  | 1100000  0000000 | 0011000  0000000 | 1100000  0000000 | 1100000  0000000 | 0011000  0000000 | 1100000  0000000 | 1100000  0000000 |
| Duration of CORESET | slot | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| REG bundle size |  | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| DMRS precoder granularity |  | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size | Same as REG bundle size |
| CCE to REG mapping |  | Interleaved | Interleaved | Interleaved | Interleaved | Interleaved | Interleaved | Interleaved |
| Interleave n\_shift |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Interleave size |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Beamforming Pre-Coder |  | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Aggregation level | CCE | 4 | 4 | 4 | 8 | 8 | 8 | 4 |
| DCI formats |  | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 |
| Payload size (without CRC) | bits | Note 2 | Note 2 | Note 2 | Note 2 | 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 PDSCH RMC is scheduled.  Note 4: *monitoringSlotPeriodicityAndOffet* is set to “sl1 0” if it is specifically stated that cell(s) configured with one of the control channel RMCs above shall transmit PDCCHs continuously. | | | | | | | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

## A.3.13B Test Cases for EN-DC and NE-DC Operations

### A.3.13B.1 Active BWP switch Test Cases for EN-DC and NE-DC Operations

#### A.3.13B.1.1 Introduction

This clause defines a principle which is applicable to test cases verifying active BWP switch requirements for EN-DC operation and NE-DC operations.

In Annex A test cases are defined for both EN-DC and NE-DC operations to verify the same type of RRM requirement.

#### A.3.13B.1.2 Principle of Testing

UE capable of both EN-DC and NE-DC operations needs to be tested with one of the tests in either EN-DC or NE-DC operations.

### A.3.13B.2 SFTD accuracy Test Cases for EN-DC and NE-DC Operations

#### A.3.13B.2.1 Introduction

This clause defines a principle which is applicable to test cases verifying SFTD accuracy requirements for EN-DC operation and NE-DC operations.

In Annex A test cases are defined for both EN-DC and NE-DC operations to verify the same type of RRM requirement.

#### A.3.13B.2.2 Principle of Testing

UE capable of both EN-DC and NE-DC operations needs to be tested with one of the tests in either EN-DC or NE-DC operations.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.3.14.2 TDD

<<Unchanged sections skipped>>

**Table A.3.14.2-3: CSI-RS Reference Measurement Channels for SCS=120kHz**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | CSI-RS.3.1 TDD | CSI-RS.3.2 TDD | CSI-RS.3.3 TDD | CSI-RS.3.4 TDD |
| Resource Type | periodic | periodic | aperiodic | aperiodic |
| Resource Set Config |  |  |  |  |
| nzp-CSI-ResourceSetId | 0 | 0 | 0 | 0 |
| repetition | n.a. | off | off | on |
| aperiodicTriggeringOffset | n.a. | n.a. | 4 | 4 |
| trs-Info | n.a. | n.a. | n.a. | n.a. |
| **Resource Config** |  |  |  |  |
| nzp-CSI-RS-ResourceId | 0 for resource #0 | 0 for resource #0 | 0 for resource #0 | 0 for resource #0 |
| 1 for resource #1 |
| 2 for resource #2 |
| 3 for resource #3 |
| 1 for resource #1 | 1 for resource #1 | 4 for resource #4 |
| 5 for resource #5 |
| 6 for resource #6 |
| 7 for resource #7 |
| powerControlOffset | 0 | 0 | 0 | 0 |
| powerControlOffsetSS | db0 | db0 | db0 | db0 |
| scramblingID | 0 | 0 | 0 | 0 |
| Period (slots) | slot40 | slot80 | n.a. | n.a. |
| Offset | 8 | 8 | n.a. | n.a. |
| qcl-InfoPeriodicCSI-RS | TCI.State.0 | TCI.State.0 | n.a. | n.a. |
| TCI.State.1 |
| frequencyDomainAllocation | 000001 | 0001 | 0001 | 0001 |
| nrofPorts | 2 | 1 | 1 | 1 |
| firstOFDMSymbolInTimeDomain | 5 for resource #0 | 6 for resource #0 | 6 for resource #0 | 0 for resource #0 |
| 1 for resource #1 |
| 2 for resource #2 |
| 3 for resource #3 |
| 10 for resource #1 | 10 for resource #1 | 4 for resource #4 |
| 5 for resource #5 |
| 6 for resource #6 |
| 7 for resource #7 |
| cdm-Type | FD-CDM2 | noCDM | noCDM | noCDM |
| density | 1 | 3 | 3 | 3 |
| startingRB | 0 | 0 | 0 | 0 |
| nrofRBs | 276 (Note 1) | 276 (Note 1) | 276 (Note 1) | 276 (Note 1) |
| Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP. | | | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

## A.3A.7 NE-DC test setup

### A.3A.7.1 Introduction

### A.3A.7.2 E-UTRAN Serving Cell Parameters

#### A.3A.7.2.1 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1

The parameters are same as as specified in clause A.3.7.2.1.

#### A.3A.7.2.2 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2

The parameters are same as as specified in clause A.3.7.2.2.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.4.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means uplink signal

- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means no uplink signal.

#### A.4.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

##### A.4.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.4.5.1.1.1-1. The test parameters are given in Tables A.4.5.1.1.1-2, A.4.5.1.1.1-3, and A.4.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.1.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.4.5.1.1.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active E-UTRA PCell | | |  | Cell 1 |
| E-UTRA RF Channel Number | | |  | 1 |
| Active PSCell | | |  | Cell 2 |
| RF Channel Number | | |  | 2 |
| Duplex mode | | Config 1, 4 |  | FDD |
|  | | Config 2, 3, 5, 6 |  | TDD |
| BWchannel | | Config 1, 4 | MHz | 10: NRB,c = 52 |
|  | | Config 2, 5 |  | 10: NRB,c = 52 |
|  | | Config 3, 6 |  | 40: NRB,c = 106 |
| DL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 4 |  | Not Applicable |
|  | | Config 2, 5 |  | TDDConf.1.1 |
|  | | Config 3, 6 |  | TDDConf.2.1 |
| RMSI CORESET | | Config 1, 4 |  | CR.1.1 FDD |
| Reference Channel | | Config 2, 5 |  | CR.1.1 TDD |
|  | | Config 3, 6 |  | CR.2.1 TDD |
| Dedicated CORESET  Reference Channel | | Config 1, 4 |  | CCR.1.3 FDD |
| Config 2, 5 |  | CCR.1.3 TDD |
| Config 3, 6 |  | CCR.2.2 TDD |
| SSB Configuration | | Config 1, 4 |  | SSB.1 FR1 |
|  | | Config 2, 5 |  | SSB.1 FR1 |
|  | | Config 3, 6 |  | SSB.2 FR1 |
| SMTC | | Config 1, 2, 4, 5 |  | SMTC.1 |
| Configuration | | Config 3, 6 |  | SMTC.1 |
| PDSCH/PDCCH | | Config 1, 2, 4, 5 |  | 15 kHz |
| subcarrier spacing | | Config 3, 6 |  | 30 kHz |
| PRACH Configuration | | Config 1, 2, 4, 5 |  | Table A.3.8.2.1-1 |
|  | | Config 3, 6 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| Out of sync | DCI format | |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | *gp0* |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI | | Config 1, 4 |  | CSI-RS.1.1 FDD |
| reporting | | Config 2, 5 |  | CSI-RS.1.1 TDD |
|  | | Config 3, 6 |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1, 4 |  | TRS.1.1 FDD |
|  | | Config 2, 5 |  | TRS.1.1 TDD |
|  | | Config 3, 6 |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.48 |
| T3 | | | s | 0.48 |
| D1 | | | s | 0.44 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | |

Table A.4.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | | T2 | | T3 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on | Config 1, 4 | dB | 1 | -7 | | -15 | |
| RLM-RS | Config 2, 5 |  | 1 | -7 | | -15 | |
|  | Config 3, 6 |  | 1 | -7 | | -15 | |
|  | Config 1, 4 | dBm/15 kHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
|  | Config 1, 4 | dBm/SCS | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -95 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs. | | | | | | | |

Table A.4.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
|  | Value |
| gapOffset | 0 |
| Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap). | |

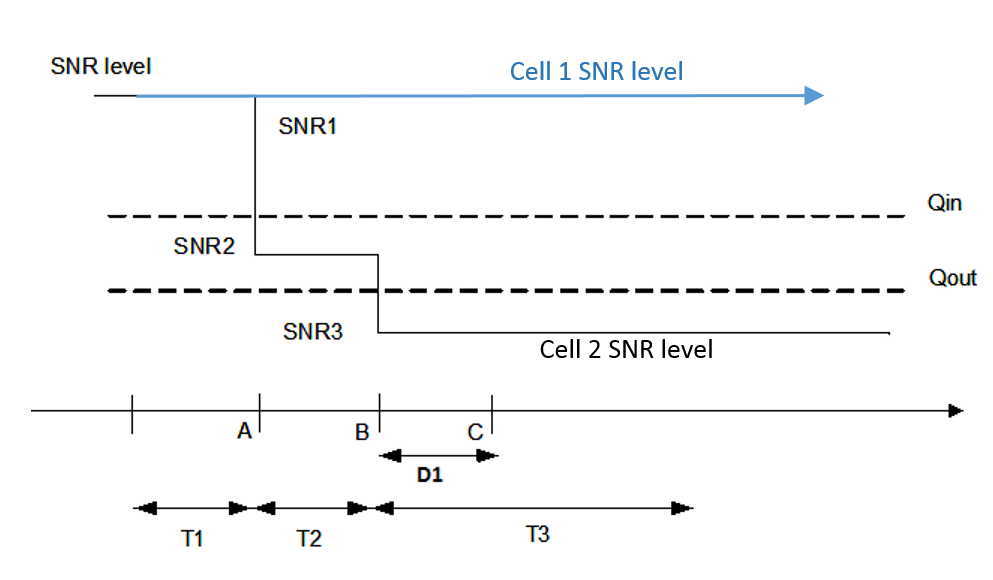
****

Figure A.4.5.1.1.1-1: SNR variation for out-of-sync testing

##### A.4.5.1.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

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

#### A.4.5.1.2 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

##### A.4.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.4.5.1.2.1-1. The test parameters are given in Tables A.4.5.1.2.1-2, and A.4.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.2.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.4.5.1.2.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value |
|  | | | |  | Test 1 |
| Active E-UTRA PCell | | | |  | Cell 1 |
| E-UTRA RF Channel Number | | | |  | 1 |
| Active PSCell | | | |  | Cell 2 |
| RF Channel Number | | | |  | 2 |
| Duplex mode | | | Config 1, 4 |  | FDD |
|  | | | Config 2, 3, 5, 6 |  | TDD |
| BWchannel | | | Config 1, 4 | MHz | 10: NRB,c = 52 |
|  | | | Config 2, 5 |  | 10: NRB,c = 52 |
|  | | | Config 3, 6 |  | 40: NRB,c = 106 |
| DL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |
| TDD | | | Config 1, 4 |  | Not Applicable |
| Configuration | | | Config 2, 5 |  | TDDConf.1.1 |
|  | | | Config 3, 6 |  | TDDConf.2.1 |
| RMSI CORESET  Reference  Channel | | | Config 1, 4 |  | CR.1.1 FDD |
| Config 2, 5 |  | CR.1.1 TDD |
| Config 3, 6 |  | CR.2.1 TDD |
| Dedicated CORESET  Reference  Channel | | | Config 1, 4 |  | CCR.1.1 FDD |
| Config 2, 5 |  | CCR.1.1 TDD |
| Config 3, 6 |  | CCR.2.1 TDD |
| SSB | | | Config 1, 4 |  | SSB.1 FR1 |
| Configuration | | | Config 2, 5 |  | SSB.1 FR1 |
|  | | | Config 3, 6 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1, 2, 4, 5 |  | SMTC.1 |
|  | | | Config 3, 6 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier | | | Config 1, 2, 4, 5 |  | 15 kHz |
| spacing | | | Config 3, 6 |  | 30 kHz |
| PRACH Configuration | | | Config 1, 2, 4, 5 |  | Table  A.3.8.2.1-1 |
|  | | | Config 3, 6 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | | |  | 0 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |
| In sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| Out of sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 4 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| DRX | | | |  | *OFF* |
| Gap pattern ID | | | |  | N.A. |
| Layer 3 filtering | | | |  | *Enabled* |
| T310 timer | | | | ms | 1000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS for | | Config 1, 4 | |  | CSI-RS.1.1 FDD |
| CSI reporting | | Config 2, 5 | |  | CSI-RS.1.1 TDD |
|  | | Config 3, 6 | |  | CSI-RS.2.1 TDD |
| CSI-RS for | | Config 1, 4 | |  | TRS.1.1 FDD |
| tracking | | Config 2, 5 | |  | TRS.1.1 TDD |
|  | | Config 3, 6 | |  | TRS.1.2 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 0.24 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 0.88 |
| D1 | | | | s | 0.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | | |

Table A.4.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on | Config 1, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3, 6 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1, 4 | dBm/15 kHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
|  | Config 1, 4 | dBm/SCS | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -95 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.2.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

Table A.4.5.1.2.1-4: Void

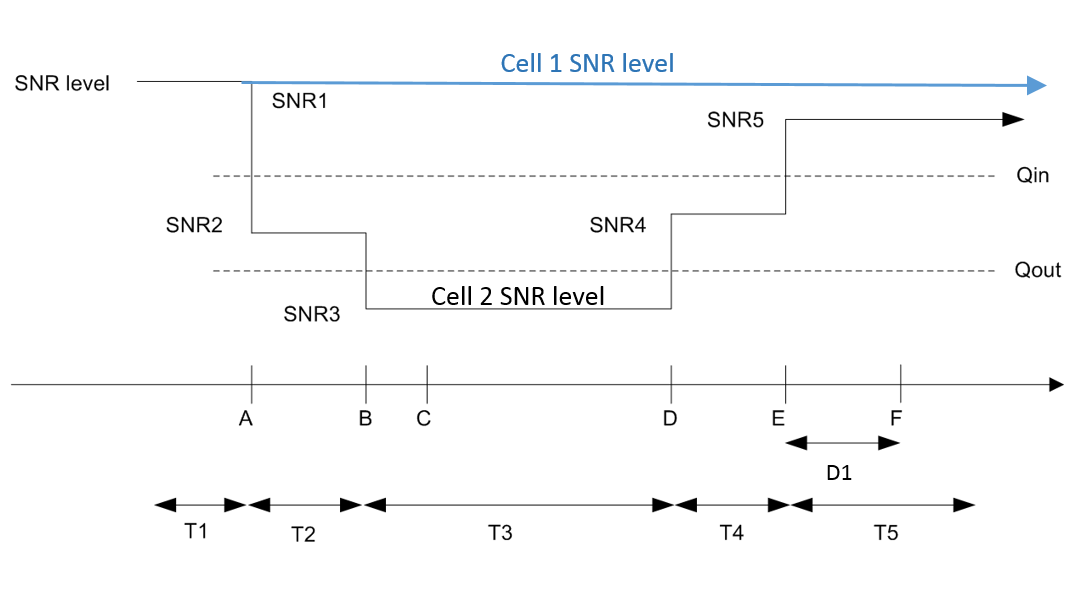
****

Figure A.4.5.1.2.1-1: SNR variation for in-sync testing

##### A.4.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.4.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

##### A.4.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.4.5.1.3.1-1. The test parameters are given in Tables A.4.5.1.3.1-2 and A.4.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.3.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.4.5.1.3.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active E-UTRA PCell | | |  | Cell 1 |
| E-UTRA RF Channel Number | | |  | 1 |
| Active PSCell | | |  | Cell 2 |
| RF Channel Number | | |  | 2 |
| Duplex mode | | Config 1, 4 |  | FDD |
|  | | Config 2, 3, 5, 6 |  | TDD |
| BWchannel | | Config 1, 4 | MHz | 10: NRB,c = 52 |
|  | | Config 2, 5 |  | 10: NRB,c = 52 |
|  | | Config 3, 6 |  | 40: NRB,c = 106 |
| DL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |
| TDD | | Config 1, 4 |  | Not Applicable |
| Configuration | | Config 2, 5 |  | TDDConf.1.1 |
|  | | Config 3, 6 |  | TDDConf.2.1 |
| RMSI CORESET  Reference  Channel | | Config 1, 4 |  | CR.1.1 FDD |
| Config 2, 5 |  | CR.1.1 TDD |
| Config 3, 6 |  | CR.2.1 TDD |
| Dedicated CORESET  Reference  Channel | | Config 1, 4 |  | CCR.1.3 FDD |
| Config 2, 5 |  | CCR.1.3 TDD |
| Config 3, 6 |  | CCR.2.2 TDD |
| SSB | | Config 1, 4 |  | SSB.1 FR1 |
| Configuration | | Config 2, 5 |  | SSB.1 FR1 |
|  | | Config 3, 6 |  | SSB.2 FR1 |
| SMTC | | Config 1, 2, 4, 5 |  | SMTC.1 |
| Configuration | | Config 3, 6 |  | SMTC.1 |
| PDSCH/PDCCH | | Config 1, 2, 4, 5 |  | 15 kHz |
| subcarrier spacing | | Config 3, 6 |  | 30 kHz |
| PRACH | | Config 1, 2, 4, 5 |  | Table A.3.8.2.1-1 |
| Configuration | | Config 3, 6 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| Out of sync | DCI format | |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX Configuration | | |  | DRX.3 |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI | | Config 1, 4 |  | CSI-RS.1.1 FDD |
| reporting | | Config 2, 5 |  | CSI-RS.1.1 TDD |
|  | | Config 3, 6 |  | CSI-RS.2.1 TDD |
| CSI-RS for | | Config 1, 4 |  | TRS.1.1 FDD |
| tracking | | Config 2, 5 |  | TRS.1.1 TDD |
|  | | Config 3, 6 |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.68 |
| T3 | | | s | 0.68 |
| D1 | | | s | 0.64 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | |

Table A.4.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB | 0 | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on | Config 1, 4 | dB | 1 | -7 | -15 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 |
|  | Config 3, 6 |  | 1 | -7 | -15 |
|  | Config 1, 4 | dBm/15kHz | -98 | | |
|  | Config 2, 5 |  | -98 | | |
|  | Config 3, 6 |  | -98 | | |
|  | Config 1, 4 | dBm/SCS | -98 | | |
|  | Config 2, 5 |  | -98 | | |
|  | Config 3, 6 |  | -95 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.4.5.1.3.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. | | | | | |

Table A.4.5.1.3.1-4: Void

Table A.4.5.1.3.1-5: Void

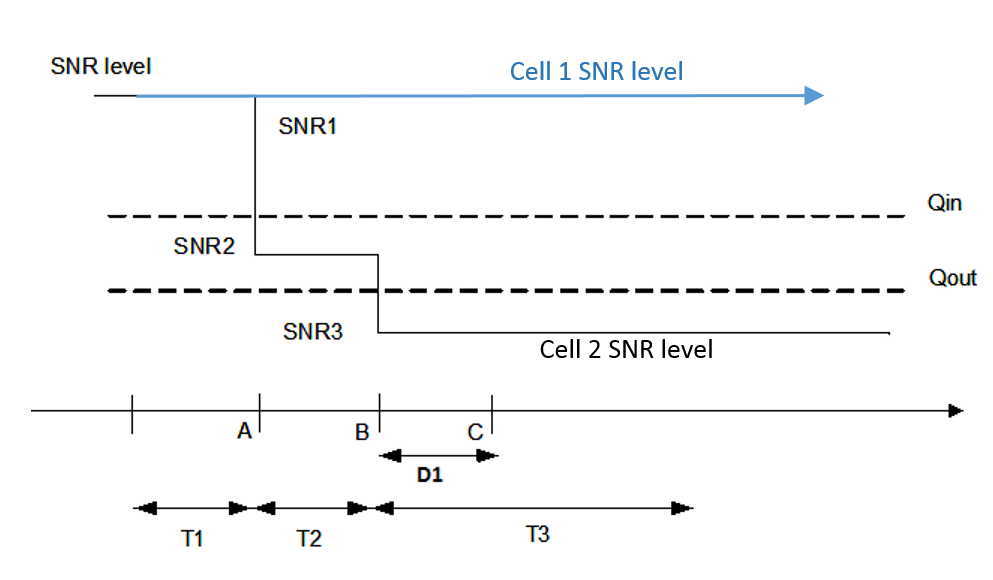
****

Figure A.4.5.1.3.1-1: SNR variation for out-of-sync testing

##### A.4.5.1.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

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

#### A.4.5.1.4 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

##### A.4.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.4.5.1.4.1-1. The test parameters are given in Tables A.4.5.1.4.1-2, and A.4.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.4.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.4.5.1.4.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value |
|  | | | |  | Test 1 |
| Active E-UTRA PCell | | | |  | Cell 1 |
| E-UTRA RF Channel Number | | | |  | 1 |
| Active PSCell | | | |  | Cell 2 |
| RF Channel Number | | | |  | 2 |
| Duplex mode | | | Config 1, 4 |  | FDD |
|  | | | Config 2, 3, 5, 6 |  | TDD |
| BWchannel | | | Config 1, 4 | MHz | 10: NRB,c = 52 |
|  | | | Config 2, 5 |  | 10: NRB,c = 52 |
|  | | | Config 3, 6 |  | 40: NRB,c = 106 |
| DL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |
|  | | | Config 2, 5 |  | TDDConf.1.1 |
|  | | | Config 3, 6 |  | TDDConf.2.1 |
| RMSI CORESET Reference  Channel | | | Config 1, 4 |  | CR.1.1 FDD |
| Config 2, 5 |  | CR.1.1 TDD |
| Config 3, 6 |  | CR.2.1 TDD |
| Dedicated CORESET Reference  Channel | | | Config 1, 4 |  | CCR.1.1 FDD |
| Config 2, 5 |  | CCR.1.1 TDD |
| Config 3, 6 |  | CCR.2.1 TDD |
| SSB Configuration | | | Config 1, 4 |  | SSB.1 FR1 |
|  | | | Config 2, 5 |  | SSB.1 FR1 |
|  | | | Config 3, 6 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1, 2, 4, 5 |  | SMTC.1 |
|  | | | Config 3, 6 |  | SMTC.1 |
| PDSCH/PDCCH | | | Config 1, 2, 4, 5 |  | 15 kHz |
| subcarrier spacing | | | Config 3, 6 |  | 30 kHz |
| PRACH Configuration | | | Config 1, 2, 4, 5 |  | Table A A.3.8.2.1-1 |
|  | | | Config 3, 6 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | | |  | 0 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |
| In sync | DCI format | | |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| Out of sync | DCI format | | |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 4 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| DRX Configuration | | | |  | DRX.3 |
| Gap pattern ID | | | |  | N.A. |
| Layer 3 filtering | | | |  | *Enabled* |
| T310 timer | | | | ms | 1000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS for CSI | | Config 1, 4 | |  | CSI-RS.1.1 FDD |
| reporting | | Config 2, 5 | |  | CSI-RS.1.1 TDD |
|  | | Config 3, 6 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1, 4 | |  | TRS.1.1 FDD |
|  | | Config 2, 5 | |  | TRS.1.1 TDD |
|  | | Config 3, 6 | |  | TRS.1.2 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 0.64 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 0.88 |
| D1 | | | | s | 0.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | | |

Table A.4.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on | Config 1, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3, 6 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1, 4 | dBm/15 kHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
|  | Config 1, 4 | dBm/SCS | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -95 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.4.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

**Table A.4.5.1.4.1-4: Void**

**Table A.4.5.1.4.1-5: Void**

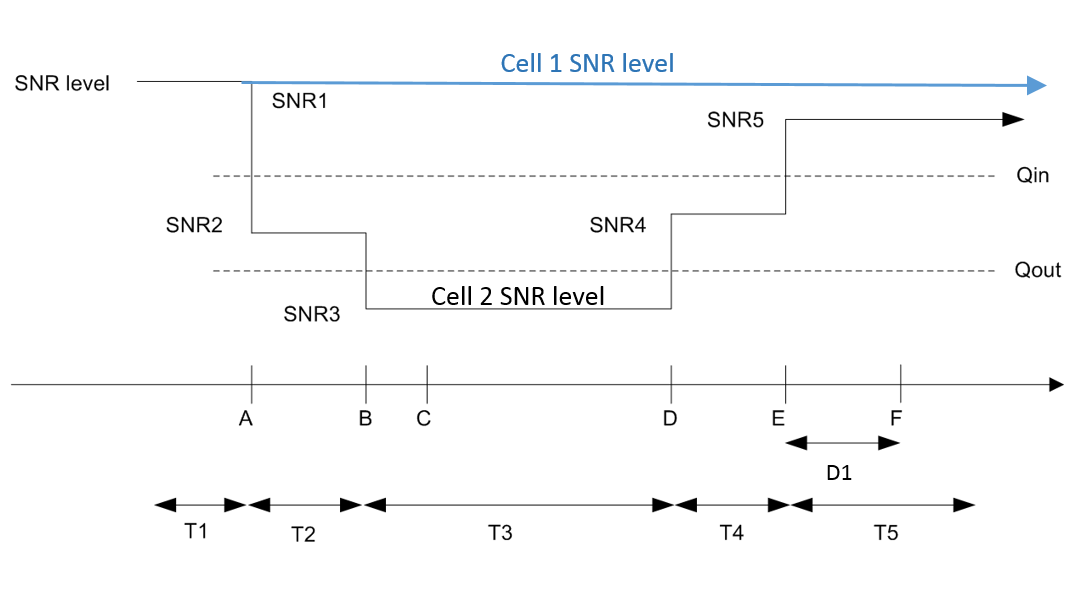
****

Figure A.4.5.1.4.1-1: SNR variation for in-sync testing

##### A.4.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.4.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

##### A.4.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.5.1-1, A.4.5.1.5.1-2, A.4.5.1.5.1-3, and A.4.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.5.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.1.5.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active E-UTRA PCell | |  | Cell 1 |
| E-UTRA RF Channel Number | |  | 1 |
| Active PSCell | |  | Cell 2 |
| RF Channel Number | |  | 2 |
| Duplex mode | Config 1, 4 |  | FDD |
|  | Config 2, 3, 5, 6 |  | TDD |
| TDD Configuration | Config 1, 4 |  | Not Applicable |
|  | Config 2, 5 |  | TDDConf.1.1 |
|  | Config 3, 6 |  | TDDConf.2.1 |
| DL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1, 4 |  | CR.1.1 FDD |
| Config 2, 5 | CR.1.1 TDD |
| Config 3, 6 | CR.2.1 TDD |
| Dedicated CORESET Reference  Channel | Config 1, 4 |  | CCR.1.3 FDD |
| Config 2, 5 |  | CCR.1.3 TDD |
| Config 3, 6 |  | CCR.2.2 TDD |
| SSB Configuration | Config 1, 4 |  | SSB.1 FR1 |
|  | Config 2, 5 |  | SSB.1 FR1 |
|  | Config 3, 6 |  | SSB.2 FR1 |
| SMTC Configuration | Config 1, 2, 4, 5 |  | SMTC.1 |
|  | Config 3, 6 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier | Config 1, 2, 4, 5 |  | 15 KHz |
| spacing | Config 3, 6 |  | 30 KHz |
| TRS configuration | Config 1, 4 |  | TRS.1.1 FDD |
|  | Config 2, 5 |  | TRS.1.1 TDD |
|  | Config 3, 6 |  | TRS.1.2 TDD |
| CSI-RS for RLM | Config 1, 4 |  | Resource #4 in TRS.1.1 FDD |
|  | Config 2, 5 |  | Resource #4 in TRS.1.1 TDD |
|  | Config 3, 6 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | |  | TCI.State. 2 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low |
| Out of sync transmission | DCI format |  | 1-0 |
| parameters | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | OFF |
| Gap pattern ID | |  | gp0 |
| Layer 3 filtering | |  | Enabled |
| T310 timer | | ms | 0 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for reporting | Config 1, 4 |  | CSI-RS1.1 FDD |
|  | Config 2, 5 |  | CSI-RS.1.1 TDD |
|  | Config 3, 6 |  | CSI-RS.2.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.48 |
| T3 | | s | 0.48 |
| D1 | | s | 0.44 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts.  Note 2: E-UTRAN is in non-DRX mode under test. | | | |

Table A.4.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on | Config 1, 4 | dB | 1 | -7 | -15 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 |
|  | Config 3, 6 |  | 1 | -7 | -15 |
|  | Config 1, 4 | dBm/15KHz | -98 | | |
|  | Config 2, 5 |  | -98 | | |
|  | Config 3, 6 |  | -98 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.5.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1.. | | | | | |

Table A.4.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
|  | Value |
| gapOffset | 0 |
| Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. | |

Table A.4.5.1.5.1-4: Void

****

Figure A.4.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.4.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D1 after the start of the time duration T3) on the PSCell.

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

#### A.4.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

##### A.4.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.6.1-1, A.4.5.1.6.1-2, and A.4.5.1.6.1-3 below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.6.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.1.6.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value |
|  | | | |  | Test 1 |
| Active E-UTRA PCell | | | |  | Cell 1 |
| E-UTRA RF Channel Number | | | |  | 1 |
| Active PSCell | | | |  | Cell 2 |
| RF Channel Number | | | |  | 2 |
| Duplex mode | | | Config 1, 4 |  | FDD |
|  | | | Config 2, 3, 5, 6 |  | TDD |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |
|  | | | Config 2, 5 |  | TDDConf.1.1 |
|  | | | Config 3, 6 |  | TDDConf.2.1 |
| DL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |
| RMSI CORESET Reference  Channel | | | Config 1, 4 |  | CR.1.1 FDD |
| Config 2, 5 |  | CR.1.1 TDD |
| Config 3, 6 |  | CR.2.1 TDD |
| Dedicated CORESET Reference  Channel | | | Config 1, 4 |  | CCR.1.1 FDD |
| Config 2, 5 |  | CCR.1.1 TDD |
| Config 3, 6 |  | CCR.2.1 TDD |
| SSB Configuration | | | Config 1, 4 |  | SSB.1 FR1 |
|  | | | Config 2, 5 |  | SSB.1 FR1 |
|  | | | Config 3, 6 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1, 2, 4, 5 |  | SMTC.1 |
|  | | | Config 3, 6 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier | | | Config 1, 2, 4, 5 |  | 15 KHz |
| spacing | | | Config 3, 6 |  | 30 KHz |
| TRS configuration | | | Config 1, 4 |  | TRS.1.1 FDD |
|  | | | Config 2, 5 |  | TRS.1.1 TDD |
|  | | | Config 3, 6 |  | TRS.1.2 TDD |
| CSI-RS for RLM | | | Config 1, 4 |  | Resource #4 in TRS.1.1 FDD |
|  | | | Config 2, 5 |  | Resource #4 in TRS.1.1 TDD |
|  | | | Config 3, 6 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | | | |  | TCI.State. 2 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 4 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| In sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 0 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| DRX | | | |  | OFF |
| Gap pattern ID | | | |  | N.A. |
| Layer 3 filtering | | | |  | Enabled |
| T310 timer | | | | ms | 1000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS for reporting | | Config 1, 4 | |  | CSI-RS.1.1 FDD |
|  | | Config 2, 5 | |  | CSI-RS.1.1 TDD |
|  | | Config 3, 6 | |  | CSI-RS.2.1 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 0.44 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 0.88 |
| T6 | | | | s | 0.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts.  Note 2: E-UTRAN is in non-DRX mode under test. | | | | | |

Table A.4.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB |  | | | | |
| EPRE ratio of PSS to SSSPSS\_beta | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRSSSS\_beta | | dB | 0 | | | | |
| EPRE ratio of PDSCH to PDSCH DMRSPDSCH\_beta | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on | Config 1, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3, 6 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1, 4 | dBm/15KHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.4.5.1.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1.. | | | | | | | |

Table A.4.5.1.6.1-3A: Void

Table A.4.5.1.6.1-4: Void

****

Figure A.4.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

##### A.4.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

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

#### A.4.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

##### A.4.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.7.1-1, A.4.5.1.7.1-2, and A.4.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.7.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.1.7.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active E-UTRA PCell | |  | Cell 1 |
| E-UTRA RF Channel Number | |  | 1 |
| Active PSCell | |  | Cell 2 |
| RF Channel Number | |  | 2 |
| Duplex mode | Config 1, 4 |  | FDD |
|  | Config 2, 3, 5, 6 |  | TDD |
| TDD Configuration | Config 1, 4 |  | Not Applicable |
|  | Config 2, 5 |  | TDDConf.1.1 |
|  | Config 3, 6 |  | TDDConf.2.1 |
| DL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1, 4 |  | CR.1.1 FDD |
| Config 2, 5 | CR.1.1 TDD |
| Config 3, 6 | CR.2.1 TDD |
| Dedicated CORESET Reference  Channel | Config 1, 4 |  | CCR.1.3 FDD |
| Config 2, 5 |  | CCR.1.3 TDD |
| Config 3, 6 |  | CCR.2.2 TDD |
| SSB Configuration | Config 1, 4 |  | SSB.1 FR1 |
|  | Config 2, 5 |  | SSB.1 FR1 |
|  | Config 3, 6 |  | SSB.2 FR1 |
| SMTC Configuration | Config 1, 2, 4, 5 |  | SMTC.1 |
|  | Config 3, 6 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier | Config 1, 2, 4, 5 |  | 15 KHz |
| spacing | Config 3, 6 |  | 30 KHz |
| TRS configuration | Config 1, 4 |  | TRS.1.1 FDD |
|  | Config 2, 5 |  | TRS.1.1 TDD |
|  | Config 3, 6 |  | TRS.1.2 TDD |
| CSI-RS for RLM | Config 1, 4 |  | Resource #4 in TRS.1.1 FDD |
|  | Config 2, 5 |  | Resource #4 in TRS.1.1 TDD |
|  | Config 3, 6 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | |  | TCI.State. 2 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low |
| Out of sync transmission | DCI format |  | 1-0 |
| parameters | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | DRX.3 |
| Gap pattern ID | |  | N.A. |
| Layer 3 filtering | |  | Enabled |
| T310 timer | | ms | 0 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for reporting | Config 1, 4 |  | CSI-RS.1.1 FDD |
|  | Config 2, 5 |  | CSI-RS.1.1 TDD |
|  | Config 3, 6 |  | CSI-RS.2.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 1.28 |
| T3 | | s | 1.28 |
| D1 | | s | 1.24 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts.  Note 2: E-UTRAN is in non-DRX mode under test. | | | |

Table A.4.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB |  | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | |
| EPRE ratio of PBCH to PBCH DMRSSSS\_beta | | dB | 0 | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMR | | dB |  | | |
| SNR on | Config 1, 4 | dB | 1 | -7 | -15 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 |
|  | Config 3, 6 |  | 1 | -7 | -15 |
|  | Config 1, 4 | dBm/15KHz | -98 | | |
|  | Config 2, 5 |  | -98 | | |
|  | Config 3, 6 |  | -98 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.7.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1.. | | | | | |

Table A.4.5.1.7.1-3A: Void

Table A.4.5.1.7.1-4: Void

Table A.4.5.1.7.1-5: Void

Table A.4.5.1.7.1-6: Void

****

Figure A.4.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.4.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D1 after the start of the time duration T3) on the PSCell.

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

#### A.4.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

##### A.4.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.8.1-1, A.4.5.1.8.1-2, A.4.5.1.8.1-3 and A.4.5.1.8.1-3A below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.8.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.8.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.1.8.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value |
|  | | | |  | Test 1 |
| Active E-UTRA PCell | | | |  | Cell 1 |
| E-UTRA RF Channel Number | | | |  | 1 |
| Active PSCell | | | |  | Cell 2 |
| RF Channel Number | | | |  | 2 |
| Duplex mode | | | Config 1, 4 |  | FDD |
|  | | | Config 2, 3, 5, 6 |  | TDD |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |
|  | | | Config 2, 5 |  | TDDConf.1.1 |
|  | | | Config 3, 6 |  | TDDConf.2.1 |
| DL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | | | Config 1, 4 |  | CR.1.1 FDD |
| Config 2, 5 | CR.1.1 TDD |
| Config 3, 6 | CR.2.1 TDD |
| Dedicated CORESET Reference  Channel | | | Config 1, 4 |  | CCR.1.1 FDD |
| Config 2, 5 |  | CCR.1.1 TDD |
| Config 3, 6 |  | CCR.2.1 TDD |
| SSB Configuration | | | Config 1, 4 |  | SSB.1 FR1 |
|  | | | Config 2, 5 |  | SSB.1 FR1 |
|  | | | Config 3, 6 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1, 2, 4, 5 |  | SMTC.1 |
|  | | | Config 3, 6 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier | | | Config 1, 2, 4, 5 |  | 15 KHz |
| spacing | | | Config 3, 6 |  | 30 KHz |
| TRS configuration | | | Config 1, 4 |  | TRS.1.1 FDD |
|  | | | Config 2, 5 |  | TRS.1.1 TDD |
|  | | | Config 3, 6 |  | TRS.1.2 TDD |
| CSI-RS for RLM | | | Config 1, 4 |  | Resource #4 in TRS.1.1 FDD |
|  | | | Config 2, 5 |  | Resource #4 in TRS.1.1 TDD |
|  | | | Config 3, 6 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | | | |  | TCI.State. 2 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |
| Out of sync transmission parameters | | DCI format | |  | 1-0 |
|  | | Number of Control OFDM symbols | |  | 2 |
|  | | Aggregation level | | CCE | 8 |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | dB | 4 |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | dB | 4 |
|  | | DMRS precoder granularity | |  | REG bundle size |
|  | | REG bundle size | |  | 6 |
| In sync transmission parameters | | DCI format | |  | 1-0 |
|  | | Number of Control OFDM symbols | |  | 2 |
|  | | Aggregation level | | CCE | 4 |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | dB | 0 |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | dB | 0 |
|  | | DMRS precoder granularity | |  | REG bundle size |
|  | | REG bundle size | |  | 6 |
| DRX | | | |  | DRX.3 |
| Gap pattern ID | | | |  | gp0 |
| Layer 3 filtering | | | |  | Enabled |
| T310 timer | | | | ms | 2000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS for reporting | Config 1, 4 | | |  | CSI-RS.1.1 FDD |
|  | Config 2, 5 | | |  | CSI-RS.1.1 TDD |
|  | Config 3, 6 | | |  | CSI-RS.2.1 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 1.24 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 1.88 |
| T6 | | | | s | 1.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts.  Note 2: E-UTRAN is in non-DRX mode under test. | | | | | |

Table A.4.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on | Config 1, 4 | dB | 1 | -7 | -15 | -4.5 | 1 |
| RLM-RS | Config 2, 5 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3, 6 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1, 4 | dBm/15KHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1. | | | | | | | |

Table A.4.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
|  | Value |
| gapOffset | 0 |
| Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. | |

Table A.4.5.1.8.1-4: Void

Table A.4.5.1.8.1-5: Void

Table A.4.5.1.8.1-6: Void

****

Figure A.4.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

##### A.4.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

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

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.4.5.2 Interruption

#### A.4.5.2.1 E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

##### A.4.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in TS38.133 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.1.1-2 and A.4.5.2.1.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.1.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. CORESET indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.4.5.2.1.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | One is E-UTRAN RF channel and the other is NR RF channel |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| CP length |  | Normal | Applicable to Cell1 and Cell2 |
| DRX |  | DRX.4 | DRX related parameters are defined in Table A.3.3.4-1 |
| Measurement gap pattern Id |  | OFF |  |
| T1 | s | 10 |  |

Table A.4.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell2 |
| Frequency Range | |  | FR1 |
| Duplex mode | Config 1,4 |  | FDD |
|  | Config 2,3,5,6 |  | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable |
|  | Config 2,5 |  | TDDConf.1.1 |
|  | Config 3,6 |  | TDDConf.2.1 |
| BWchannel | Config 1,4 |  | 10: NRB,c = 52 |
|  | Config 2,5 |  | 10: NRB,c = 52 |
|  | Config 3,6 |  | 40: NRB,c = 106 |
| Initial DL BWP | Config 1,4 |  | DLBWP.0.1 |
| Configuration | Config 2,5 |  | DLBWP.0.1 |
|  | Config 3,6 |  | DLBWP.0.1 |
| Dedicated DL BWP Configuration | Config 1,4 |  | DLBWP.1.1 |
|  | Config 2,5 |  | DLBWP.1.1 |
|  | Config 3,6 |  | DLBWP.1.1 |
| Initial UL BWP Configuration | Config 1,4 |  | ULBWP.0.1 |
|  | Config 2,5 |  | ULBWP.0.1 |
|  | Config 3,6 |  | ULBWP.0.1 |
| Dedicated UL BWP Configuration | Config 1,4 |  | ULBWP.1.1 |
|  | Config 2,5 |  | ULBWP.1.1 |
|  | Config 3,6 |  | ULBWP.1.1 |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | Config 2,5 |  | SR.1.1 TDD |
|  | Config 3,6 |  | SR.2.1 TDD |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD |
| parameters | Config 2,5 |  | CR.1.1 TDD |
|  | Config 3,6 |  | CR.2.1 TDD |
| PDCCH CORESET | Config 1,4 |  | CCR.1.1 FDD |
| parameters | Config 2,5 |  | CCR.1.1 TDD |
|  | Config 3,6 |  | CCR.2.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SMTC Configuration | |  | SMTC.1 |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD |
|  | Config 2,5 |  | TRS.1.1 TDD |
|  | Config 3,6 |  | TRS.1.2 TDD |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | Config 3,6 |  | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low |
| EPRE ratio of PSS to SSS | |  |  |
| EPRE ratio of PBCH DMRS to SSS | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |
| NocNote 2 | | dBm/15 kHz | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 |
| Ês/Iot | | dB | 17 |
| Ês/Noc | | dB | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | -58.96 |
|  | Config 3,6 | dBm/38.16MHz | -52.86 |
| Time offset to Cell1 Note 4 | | μs | 3 for intra-band EN-DC,  33 for inter-band EN-DC |
| Propagation Condition | |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells | | | |

**Table A.4.5.2.1.1-4: Void**

##### A.4.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.1.2**-**1.

Table A.4.5.2.1.2-1: Interruption length X at transition between active and non-active during DRX

|  |  |  |
| --- | --- | --- |
|  | NR Slot | Interruption length X |
|  | length (ms) | Sync |
| 0 | 1 | 1 |
| 1 | 0.5 | 1 |

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

#### A.4.5.2.2 E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

##### A.4.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1.2. Supported test configurations are shown in table A.4.5.2.2.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.2.1-2 and A.4.5.2.2.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.2.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.4.5.2.2.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | One is E-UTRAN RF channel and the other is NR RF channel |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| CP length |  | Normal | Applicable to Cell1 and Cell2 |
| DRX |  | DRX.4 | DRX related parameters are defined in Table A.3.3.4-1 |
| Measurement gap pattern Id |  | OFF |  |
| T1 | s | 10 |  |

Table A.4.5.2.2.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell2 |
| Frequency Range | | |  | FR1 |
| Duplex mode | | Config 1,4 |  | FDD |
|  | | Config 2,3,5,6 |  | TDD |
| TDD configuration | | Config 1,4 |  | Not Applicable |
|  | | Config 2,5 |  | TDDConf.1.1 |
|  | | Config 3,6 |  | TDDConf.2.1 |
| BWchannel | | Config 1,4 |  | 10: NRB,c = 52 |
|  | | Config 2,5 |  | 10: NRB,c = 52 |
|  | | Config 3,6 |  | 40: NRB,c = 106 |
| Initial DL BWP | | Config 1,4 |  | DLBWP.0.1 |
| Configuration | | Config 2,5 |  | DLBWP.0.1 |
|  | | Config 3,6 |  | DLBWP.0.1 |
| Dedicated DL BWP Configuration | | Config 1,4 |  | DLBWP.1.1 | |
|  | | Config 2,5 |  | DLBWP.1.1 | |
|  | | Config 3,6 |  | DLBWP.1.1 | |
| Initial UL BWP Configuration | | Config 1,4 |  | ULBWP.0.1 | |
|  | | Config 2,5 |  | ULBWP.0.1 | |
|  | | Config 3,6 |  | ULBWP.0.1 | |
| Dedicated UL BWP Configuration | | Config 1,4 |  | ULBWP.1.1 | |
|  | | Config 2,5 |  | ULBWP.1.1 | |
|  | | Config 3,6 |  | ULBWP.1.1 | |
| PDSCH Reference | | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | | Config 2,5 |  | SR.1.1 TDD |
|  | | Config 3,6 |  | SR.2.1 TDD |
| RMSI CORESET | | Config 1,4 |  | CR.1.1 FDD |
| parameters | | Config 2,5 |  | CR.1.1 TDD |
|  | | Config 3,6 |  | CR.2.1 TDD |
| PDCCH CORESET | | Config 1,4 |  | CCR.1.1 FDD |
| parameters | | Config 2,5 |  | CCR.1.1 TDD |
|  | | Config 3,6 |  | CCR.2.1 TDD |
| OCNG Patterns | | |  | OP.1 |
| SMTC Configuration | | |  | SMTC.1 |
| TRS configuration | | Config 1,4 |  | TRS.1.1 FDD |
|  | | Config 2,5 |  | TRS.1.1 TDD |
|  | | Config 3,6 |  | TRS.1.2 TDD |
| SSB Configuration | | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | | Config 3,6 |  | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 Low |
| EPRE ratio of PSS to SSS | | |  |  |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |
| NocNote 2 | | | dBm/15 kHz | -104 |
| SS-RSRP Note 3 | | | dBm/15 kHz | -87 |
| Ês/Iot | | | dB | 17 |
| Ês/Noc | | | dB | 17 |
| IoNote3 | | Config 1,2,4,5 | dBm/9.36MHz | -58.96 |
|  | | Config 3,6 | dBm/38.16MHz | -52.86 |
| Time offset to Cell1 Note 4 | Config 1,2,4,5 | | μs | 500 |
| Config 3,6 | | 250 |
| Propagation Condition | | |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells | | | | |

**Table A.4.5.2.2.1-4: Void**

##### A.4.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.2.2**-**1.

Table A.4.5.2.2.2-1: Interruption length X at transition between active and non-active during DRX

|  |  |  |
| --- | --- | --- |
|  | NR Slot | Interruption length X |
|  | length (ms) | Async |
| 0 | 1 | 2 |
| 1 | 0.5 | 2 |

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

#### A.4.5.2.3 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

##### A.4.5.2.3.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1.2. Supported test configurations are shown in table A.4.5.2.3.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.3.1-2 and A.4.5.2.3.1-3 below. And the E-UTRAN cell specific test parameters can refer to 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 deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.3.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration, | |

Table A.4.5.2.3.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| 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. |
| Active 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 | 640 |  |
| T1 | s | 10 |  |

Table A.4.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | Cell3 |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1,4 |  | FDD | FDD |
|  | Config 2,3,5,6 |  | TDD | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable | Not Applicable |
|  | Config 2,5 |  | TDDConf.1.1 | TDDConf.1.1 |
|  | Config 3,6 |  | TDDConf.2.1 | TDDConf.2.1 |
| BWchannel | Config 1,4 |  | Note 8 | Note 8 |
|  | Config 2,5 |  | Note 8 | Note 8 |
|  | Config 3,6 |  | Note 8 | Note 8 |
| BWoccupied | Config 1,4 | RB | 52 Note 6 | 52 Note 6 |
| Config 2,5 | 52 Note 6 | 52 Note 6 |
| Config 3,6 | 106 Note 7 | 106 Note 7 |
| Initial DL BWP | Config 1,4 |  | DLBWP.0.1 | DLBWP.0.1 |
| Configuration | Config 2,5 |  | DLBWP.0.1 | DLBWP.0.1 |
|  | Config 3,6 |  | DLBWP.0.1 | DLBWP.0.1 |
| Dedicated DL BWP | Config 1,4 |  | DLBWP.1.1 | DLBWP.1.1 |
| Configuration | Config 2,5 |  | DLBWP.1.1 | DLBWP.1.1 |
|  | Config 3,6 |  | DLBWP.1.1 | DLBWP.1.1 |
| Initial UL BWP | Config 1,4 |  | ULBWP.0.1 | ULBWP.0.1 |
| Configuration | Config 2,5 |  | ULBWP.0.1 | ULBWP.0.1 |
|  | Config 3,6 |  | ULBWP.0.1 | ULBWP.0.1 |
| Dedicated UL BWP | Config 1,4 |  | ULBWP.1.1 | ULBWP.1.1 |
| Configuration | Config 2,5 |  | ULBWP.1.1 | ULBWP.1.1 |
|  | Config 3,6 |  | ULBWP.1.1 | ULBWP.1.1 |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD | - |
| measurement channel | Config 2,5 |  | SR.1.1 TDD | - |
|  | Config 3,6 |  | SR.2.1 TDD | - |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD | CR.1.1 FDD |
| parameters | Config 2,5 |  | CR.1.1 TDD | CR.1.1 TDD |
|  | Config 3,6 |  | CR.2.1 TDD | CR.2.1 TDD |
| PDCCH CORESET | Config 1,4 |  | CCR.1.1 FDD | CCR.1.1 FDD |
| parameters | Config 2,5 |  | CCR.1.1 TDD | CCR.1.1 TDD |
|  | Config 3,6 |  | CCR.2.1 TDD | CCR.2.1 TDD |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD | TRS.1.1 FDD |
|  | Config 2,5 |  | TRS.1.1 TDD | TRS.1.1 TDD |
|  | Config 3,6 |  | TRS.1.2 TDD | TRS.1.2 TDD |
| OCNG Patterns | Config 1,2,4,5 |  | OP.1 Note 6 | OP.1 Note 6 |
| Config 3,6 |  | OP.1 Note 7 | OP.1 Note 7 |
| SMTC Configuration | |  | SMTC.1 | SMTC.1 |
| TCI state | |  | TCI.State.0 | TCI.State.0 |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 | SSB.1 FR1 |
|  | Config 3,6 |  | SSB.2 FR1 | SSB.2 FR1 |
| 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 1,2,4,5 | dBm/9.36MHz | -58.96 | -58.96 |
|  | Config 3,6 | dBm/38.16MHz | -52.86 | -52.86 |
| Time offset to Cell1 Note 4 | | μs | 3 for intra-band EN-DC,  33 for inter-band EN-DC | 3 + Time offset to Cell2 for intra-band EN-DC,  33 + Time offset to Cell2 for inter-band EN-DC |
| 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.  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 within BWoccupied.  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: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 8: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | |

##### A.4.5.2.3.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.3.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.3.2-2.

Table A.4.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length |
| 0 | 1 | 1 |
| 1 | 0.5 | 1 |

Table A.4.5.2.3.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length |
| 0 | 1 | 2 + SMTC duration |
| 1 | 0.5 | 2 + SMTC duration |

For synchronous inter-band EN-DC, the UE is only allowed to cause interruptions on E-UTRA PCell immediately before and immediately after an SMTC. Each interruption on E-UTRA PCell shall not exceed 1 subframe.

For synchronous intra-band EN-DC, the UE is only allowed to cause an interruption on E-UTRA PCell no earlier than 1 subframe before an SMTC and no later than 1 subframe after the SMTC. The interruption on E-UTRA PCell shall not exceed SMTC duration + 2 subframes.

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

#### A.4.5.2.4 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

##### A.4.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations are shown in table A.4.5.2.4.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.4.1-2 and A.4.5.2.4.1-3 below. And the E-UTRAN cell specific test parameters can refer to 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 deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.4.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration, | |

Table A.4.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| 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 | 640 |  |
| T1 | s | 10 |  |

Table A.4.5.2.4.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell2 | Cell3 |
| Frequency Range | | |  | FR1 | FR1 |
| Duplex mode | Config 1,4 | |  | FDD | FDD |
|  | Config 2,3,5,6 | |  | TDD | TDD |
| TDD configuration | Config 1,4 | |  | Not Applicable | Not Applicable |
|  | Config 2,5 | |  | TDDConf.1.1 | TDDConf.1.1 |
|  | Config 3,6 | |  | TDDConf.2.1 | TDDConf.2.1 |
| BWchannel | Config 1,4 | |  | Note 8 | Note 8 |
|  | Config 2,5 | |  | Note 8 | Note 8 |
|  | Config 3,6 | |  | Note 8 | Note 8 |
| BWoccupied | Config 1,4 | | RB | 52 Note 6 | 52 Note 6 |
| Config 2,5 | | 52 Note 6 | 52 Note 6 |
| Config 3,6 | | 106 Note 7 | 106 Note 7 |
| Initial BWP | Config 1,4 | |  | DLBWP.0.1 | DLBWP.0.1 |
| Configuration | Config 2,5 | |  | DLBWP.0.1 | DLBWP.0.1 |
|  | Config 3,6 | |  | DLBWP.0.1 | DLBWP.0.1 |
| Dedicated DL BWP | Config 1,4 | |  | DLBWP.1.1 | DLBWP.1.1 |
| Configuration | Config 2,5 | |  | DLBWP.1.1 | DLBWP.1.1 |
|  | Config 3,6 | |  | DLBWP.1.1 | DLBWP.1.1 |
| Initial UL BWP | Config 1,4 | |  | ULBWP.0.1 | ULBWP.0.1 |
| Configuration | Config 2,5 | |  | ULBWP.0.1 | ULBWP.0.1 |
|  | Config 3,6 | |  | ULBWP.0.1 | ULBWP.0.1 |
| Dedicated UL BWP | Config 1,4 | |  | ULBWP.1.1 | ULBWP.1.1 |
| Configuration | Config 2,5 | |  | ULBWP.1.1 | ULBWP.1.1 |
|  | Config 3,6 | |  | ULBWP.1.1 | ULBWP.1.1 |
| PDSCH Reference | Config 1,4 | |  | SR.1.1 FDD | - |
| measurement channel | Config 2,5 | |  | SR.1.1 TDD | - |
|  | Config 3,6 | |  | SR.2.1 TDD | - |
| RMSI CORESET | Config 1,4 | |  | CR.1.1 FDD | CR.1.1 FDD |
| parameters | Config 2,5 | |  | CR.1.1 TDD | CR.1.1 TDD |
|  | Config 3,6 | |  | CR.2.1 TDD | CR.2.1 TDD |
| PDCCH CORESET | Config 1,4 | |  | CCR.1.1 FDD | CCR.1.1 FDD |
| parameters | Config 2,5 | |  | CCR.1.1 TDD | CCR.1.1 TDD |
|  | Config 3,6 | |  | CCR.2.1 TDD | CCR.2.1 TDD |
| TRS configuration | Config 1,4 | |  | TRS.1.1 FDD | TRS.1.1 FDD |
|  | Config 2,5 | |  | TRS.1.1 TDD | TRS.1.1 TDD |
|  | Config 3,6 | |  | TRS.1.2 TDD | TRS.1.2 TDD |
| OCNG Patterns | Config 1,2,4,5 | |  | OP.1 Note 6 | OP.1 Note 6 |
| Config 3,6 | |  | OP.1 Note 7 | OP.1 Note 7 |
| SSB Configuration | Config 1,2,4,5 | |  | SSB.1 FR1 | SSB.1 FR1 |
|  | Config 3,6 | |  | SSB.2 FR1 | SSB.2 FR1 |
| SMTC Configuration |  | |  | SMTC.1 | SMTC.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 1,2,4,5 | | dBm/9.36MHz | -58.96 | -58.96 |
|  | Config 3,6 | | dBm/38.16MHz | -52.86 | -52.86 |
| Time offset to Cell1 Note 4 | | Config 1,2,4,5 | μs | 500 | 500 + Time offset to Cell2 |
| Config 3,6 | 250 | 250 + Time offset to Cell2 |
| 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.  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 within BWoccupied.  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: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 8: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | | |

##### A.4.5.2.4.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-2.

Table A.4.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length |
| 0 | 1 | 1 |
| 1 | 0.5 | 1 |

Table A.4.5.2.4.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length |
| 0 | 1 | 2 + SMTC duration |
| 1 | 0.5 | 2 + SMTC duration |

For asynchronous inter-band EN-DC, the UE is only allowed to cause interruptions on E-UTRA PCell immediately before and immediately after an SMTC. Each interruption on E-UTRA PCell shall not exceed 2 subframe.

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

#### A.4.5.2.5 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

##### A.4.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS38.133 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.5.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.5.1-2 and A.4.5.2.5.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRAN SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.5.1-1: Interruptions during measurements on deactivated E-UTRAN SCC supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.4.5.2.5.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is NR RF channel and the other two are E-UTRAN RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Active PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on E-UTRAN 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 | 640 |  |
| T1 | s | 10 |  |

Table A.4.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell2 |
| Frequency Range | |  | FR1 |
| Duplex mode | Config 1,4 |  | FDD |
|  | Config 2,3,5,6 |  | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable |
|  | Config 2,5 |  | TDDConf.1.1 |
|  | Config 3,6 |  | TDDConf.2.1 |
| BWchannel | Config 1,4 | MHz | 10: NRB,c = 52 |
|  | Config 2,5 |  | 10: NRB,c = 52 |
|  | Config 3,6 |  | 40: NRB,c = 106 |
| Initial DL BWP | Config 1,4 |  | DLBWP.0.1 |
| Configuration | Config 2,5 |  | DLBWP.0.1 |
|  | Config 3,6 |  | DLBWP.0.1 |
| Dedicated DL BWP | Config 1,4 |  | DLBWP.1.1 |
| Configuration | Config 2,5 |  | DLBWP.1.1 |
|  | Config 3,6 |  | DLBWP.1.1 |
| Initial UL BWP | Config 1,4 |  | ULBWP.0.1 |
| Configuration | Config 2,5 |  | ULBWP.0.1 |
|  | Config 3,6 |  | ULBWP.0.1 |
| Dedicated UL BWP | Config 1,4 |  | ULBWP.1.1 |
| Configuration | Config 2,5 |  | ULBWP.1.1 |
|  | Config 3,6 |  | ULBWP.1.1 |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | Config 2,5 |  | SR.1.1 TDD |
|  | Config 3,6 |  | SR.2.1 TDD |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD |
| parameters | Config 2,5 |  | CR.1.1 TDD |
|  | Config 3,6 |  | CR.2.1 TDD |
| PDCCH CORESET | Config 1,4 |  | CCR.1.1 FDD |
| parameters | Config 2,5 |  | CCR.1.1 TDD |
|  | Config 3,6 |  | CCR.2.1 TDD |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD |
|  | Config 2,5 |  | TRS.1.1 TDD |
|  | Config 3,6 |  | TRS.1.2 TDD |
| OCNG Patterns | |  | OP.1 |
| SMTC Configuration | |  | SMTC.1 |
| TCI state | |  | TCI.State.0 |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | Config 3,6 |  | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low |
| EPRE ratio of PSS to SSS | |  |  |
| EPRE ratio of PBCH DMRS to SSS | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |
| NocNote 2 | | dBm/15 kHz | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 |
| Ês/Iot | | dB | 17 |
| Ês/Noc | | dB | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | -58.96 |
|  | Config 3,6 | dBm/38.16MHz | -52.86 |
| Time offset to Cell1 Note 4 | | μs | 3 for intra-band EN-DC,  33 for inter-band EN-DC |
| Propagation Condition | |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells | | | |

##### A.4.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause one interruption on PCell and one interruption on PSCell. Each interruption on NR PSCell shall not exceed X defined in Table A.4.5.2.5.2-1 if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell or Y in Table A.4.5.2.3.2-1 if the NR PSCell is in the same band as the E-UTRAN deactivated SCell.

Table A.4.5.2.5.2-1: Interruption length X and Y at measurements on deactivated E-UTRA SCC

|  |  |  |  |
| --- | --- | --- | --- |
|  | NR Slot | Interruption length X slot | Interruption length Y slot |
|  | length (ms) | Sync |  |
| 0 | 1 | 1 | 1+SMTC duration |
| 1 | 0.5 | 1 | 1+SMTC duration |

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

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

#### A.4.5.2.6 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

##### A.4.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations are shown in table A.4.5.2.6.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.6.1-1 and A.4.5.2.6.1-2 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.6.1-1: Interruptions during measurements on deactivated E-UTRAN SCC supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.4.5.2.6.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is NR RF channel and the other two are E-UTRAN 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 E-UTRAN 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 | 640 |  |
| T1 | s | 10 |  |

Table A.4.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell2 |
| Frequency Range | |  | FR1 |
| Duplex mode | Config 1,4 |  | FDD |
|  | Config 2,3,5,6 |  | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable |
|  | Config 2,5 |  | TDDConf.1.1 |
|  | Config 3,6 |  | TDDConf.2.1 |
| BWchannel | Config 1,4 |  | 10: NRB,c = 52 |
|  | Config 2,5 |  | 10: NRB,c = 52 |
|  | Config 3,6 |  | 40: NRB,c = 106 |
| Initial DL BWP | Config 1,4 |  | DLBWP.0.1 |
| Configuration | Config 2,5 |  | DLBWP.0.1 |
|  | Config 3,6 |  | DLBWP.0.1 |
| Dedicated DL BWP | Config 1,4 |  | DLBWP.1.1 |
| Configuration | Config 2,5 |  | DLBWP.1.1 |
|  | Config 3,6 |  | DLBWP.1.1 |
| Initial UL BWP | Config 1,4 |  | ULBWP.0.1 |
| Configuration | Config 2,5 |  | ULBWP.0.1 |
|  | Config 3,6 |  | ULBWP.0.1 |
| Dedicated UL BWP | Config 1,4 |  | ULBWP.1.1 |
| Configuration | Config 2,5 |  | ULBWP.1.1 |
|  | Config 3,6 |  | ULBWP.1.1 |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | Config 2,5 |  | SR.1.1 TDD |
|  | Config 3,6 |  | SR.2.1 TDD |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD |
| parameters | Config 2,5 |  | CR.1.1 TDD |
|  | Config 3,6 |  | CR.2.1 TDD |
| PDCCH CORESET | Config 1,4 |  | CCR.1.1 FDD |
| parameters | Config 2,5 |  | CCR.1.1 TDD |
|  | Config 3,6 |  | CCR.2.1 TDD |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD |
|  | Config 2,5 |  | TRS.1.1 TDD |
|  | Config 3,6 |  | TRS.1.2 TDD |
| OCNG Patterns | |  | OP.1 |
| SMTC Configuration | |  | SMTC.1 |
| TCI state | |  | TCI.State.0 |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | Config 3,6 |  | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low |
| EPRE ratio of PSS to SSS | |  |  |
| EPRE ratio of PBCH DMRS to SSS | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |
| NocNote 2 | | dBm/15 kHz | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 |
| Ês/Iot | | dB | 17 |
| Ês/Noc | | dB | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | -58.96 |
|  | Config 3,6 | dBm/38.16MHz | -52.86 |
| Time offset to Cell1 Note 4 | Config 1,2,4,5 | μs | 500 |
| Config 3,6 | 250 |
| Propagation Condition | |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells | | | |

##### A.4.5.2.6.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on E-UTRAN PCell and NR PSCell. The UE is only allowed to cause one interruption on PCell and one interruption on PSCell. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1 and Table A.4.5.2.4.2-2.

Table A.4.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length |
| 0 | 1 | 2 |
| 1 | 0.5 | 2 |

Table A.4.5.2.6.2-2: Interruption duration if the NR PSCell is in the same band as the E-UTRAN deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length |
| 0 | 1 | 2 + SMTC duration |
| 1 | 0.5 | 2 + SMTC duration |

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

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

#### A.4.5.2.7 Void

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

#### A.4.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

##### A.4.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.3.1-1, A.4.5.5.3.1-2, and A.4.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.3.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.4.5.5.3.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.5.3.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
|  | | |  | Test 1 |  |
| Active PCell | | |  | Cell 1 |  |
| RF Channel Number | | |  | 1 |  |
| Active PSCell | | |  | Cell 2 |  |
| RF Channel Number | | |  | 2 |  |
| Duplex mode | | Config 1, 4 |  | FDD |  |
|  | | Config 2, 3, 5, 6 |  | TDD |  |
| BWchannel | | Config 1, 4 | MHz | 10: NRB,c = 52 |  |
|  | | Config 2, 5 |  | 10: NRB,c = 52 |  |
|  | | Config 3, 6 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |  |
| TDD Configuration | | Config 1, 4 |  | Not Applicable |  |
|  | | Config 2, 5 |  | TDDConf.1.1 |  |
|  | | Config 3, 6 |  | TDDConf.2.1 |  |
| CORESET | | Config 1, 4 |  | CR.1.1 FDD | A.3.1.2 |
| Reference Channel | | Config 2, 5 |  | CR.1.1 TDD |  |
|  | | Config 3, 6 |  | CR.2.1 TDD |  |
| SSB Configuration | | Config 1, 4 |  | SSB. 3 FR1 | A.3.10 |
|  | | Config 2, 5 |  | SSB. 3 FR1 |  |
|  | | Config 3, 6 |  | SSB. 4 FR1 |  |
| SMTC | | Config 1, 2, 4, 5 |  | SMTC.1 | A.3.11 |
| Configuration | | Config 3, 6 |  | SMTC.1 |  |
| PDSCH/PDCCH | | Config 1, 2, 4, 5 |  | 15 KHz |  |
| subcarrier spacing | | Config 3, 6 |  | 30 KHz |  |
| PRACH Configuration | | Config 1, 2, 4, 5 |  | FR1 PRACH configuration 4 | A.3.8.2 |
| Config 3, 6 | FR1 PRACH configuration 4 | A.3.8.2 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | | |  | 0 |  |
| OCNG parameters | | |  | OP.1 | A.3.2.1 |
| CP length | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |  |
| Beam failure | | DCI format |  | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols |  | 2 |  |
|  | | Aggregation level | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
|  | | DMRS precoder granularity |  | REG bundle size |  |
|  | | REG bundle size |  | 6 |  |
| DRX | | |  | OFF |  |
| Gap pattern ID | | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp- | Config 1, 2, 4, 5 | | dBm/SCS | -98 | Threshold used |
| ThresholdSSB | Config 3, 6 | | kHz | -95 | for Qin\_LR\_SSB |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS | | Config 1, 4 |  | CSI-RS.1.2 FDD | A.3.14 |
| configuration for q0 | | Config 2, 5 |  | CSI-RS.1.2 TDD |  |
| and q1 | | Config 3, 6 |  | CSI-RS.2.2 TDD |  |
| CSI-RS | | Config 1, 4 |  | CSI-RS.1.1 FDD | A.3.14 |
| configuration for | | Config 2, 5 |  | CSI-RS.1.1 TDD |  |
| CSI reporting | | Config 3, 6 |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | Config 1, 4 |  | TRS.1.1 FDD |  |
|  | | Config 2, 5 |  | TRS.1.1 TDD |  |
|  | | Config 3, 6 |  | TRS.1.2 TDD |  |
| csi-RS-Index | | Config 1, 4 |  | CSI-RS.1.2 FDD | A.3.14 |
| assigned as RLM | | Config 2, 5 |  | CSI-RS.1.2 TDD |  |
| RS | | Config 3, 6 |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 0.18 |  |
| T3 | | | s | 0.14 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 0.08 |  |
| D1 | | | s | 0.04 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.4.5.5.3.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1, 4 | dB | 5 | -3 | -12 | -12 | -12 |
|  | Config 2, 5 |  | 5 | -3 | -12 | -12 | -12 |
|  | Config 3, 6 |  | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1, 4 | dB | -10 | -10 | 10 | 10 | 10 |
|  | Config 2, 5 |  | -10 | -10 | 10 | 10 | 10 |
|  | Config 3, 6 |  | -10 | -10 | 10 | 10 | 10 |
| CSI-RS\_RP of set q1 | Config 1, 4 | dBm/SCS | -108 | -108 | -88 | -88 | -88 |
|  | Config 2, 5 | kHz | -108 | -108 | -88 | -88 | -88 |
|  | Config 3, 6 |  | -105 | -105 | -85 | -85 | -85 |
|  | Config 1, 4 | dBm/15 KHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6. | | | | | | | |

図形

低い精度で自動的に生成された説明

Figure A.4.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

##### A.4.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 30+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.4.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in DRX mode

##### A.4.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.4.1-1, A.4.5.5.4.1-2, A.4.5.5.4.1-3, and A.4.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.4.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.4.5.5.4.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.5.4.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value | Comment |
|  | | | |  | Test 1 |  |
| Active PCell | | | |  | Cell 1 |  |
| RF Channel Number | | | |  | 1 |  |
| Active PSCell | | | |  | Cell 2 |  |
| RF Channel Number | | | |  | 2 |  |
| Duplex mode | | | Config 1, 4 |  | FDD |  |
|  | | | Config 2, 3, 5, 6 |  | TDD |  |
| BWchannel | | | Config 1, 4 | MHz | 10: NRB,c = 52 |  |
|  | | | Config 2, 5 |  | 10: NRB,c = 52 |  |
|  | | | Config 3, 6 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |  |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |  |
|  | | | Config 2, 5 |  | TDDConf.1.1 |  |
|  | | | Config 3, 6 |  | TDDConf.2.1 |  |
| CORESET Reference | | | Config 1, 4 |  | CR.1.1 FDD | A.3.1.2 |
| Channel | | | Config 2, 5 |  | CR.1.1 TDD |  |
|  | | | Config 3, 6 |  | CR.2.1 TDD |  |
| SSB Configuration | | | Config 1, 4 |  | SSB. 3 FR1 | A.3.10 |
|  | | | Config 2, 5 |  | SSB. 3 FR1 |  |
|  | | | Config 3, 6 |  | SSB. 4 FR1 |  |
| SMTC Configuration | | | Config 1, 2, 4, 5 |  | SMTC.1 | A.3.11 |
|  | | | Config 3, 6 |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2, 4, 5 |  | 15 KHz |  |
|  | | | Config 3, 6 |  | 30 KHz |  |
| PRACH Configuration | | | Config 1, 2, 4, 5 |  | FR1 PRACH configuration 4 | A.3.8.2 |
| Config 3, 6 | FR1 PRACH configuration 4 | A.3.8.2 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | | | |  | 0 |  |
| OCNG parameters | | | |  | OP.1 | A.3.2.1 |
| CP length | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |  |
| Beam failure detection | | | DCI format |  | 1-0 |  |
| transmission parameters | | | Number of Control OFDM symbols |  | 2 |  |
|  | | | Aggregation level | CCE | 8 |  |
|  | | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
|  | | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
|  | | | DMRS precoder granularity |  | REG bundle size |  |
|  | | | REG bundle size |  | 6 |  |
| DRX | | | |  | DRX.7 | A.3.3.7 |
| Gap pattern ID | | | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | | | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2, 4, 5 | | | dBm/SCS kHz | -98 | Threshold used |
|  | Config 3, 6 | | |  | -95 | for Qin\_LR\_SSB |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for q0 and q1 | | Config 1, 4 | |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.2 TDD |  |
| CSI-RS configuration for CSI reporting | | Config 1, 4 | |  | CSI-RS.1.1 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.1 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | Config 1, 4 | |  | TRS.1.1 FDD |  |
|  | | Config 2, 5 | |  | TRS.1.1 TDD |  |
|  | | Config 3, 6 | |  | TRS.1.2 TDD |  |
| csi-RS-Index assigned as RLM RS | | Config 1, 4 | |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | | ms | 1000 |  |
| N310 | | | |  | 2 |  |
| T1 | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 8.37 |  |
| T3 | | | | s | 6.44 |  |
| T4 | | | | s | 0 |  |
| T5 | | | | s | 1.97 |  |
| D1 | | | | s | 1.93 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | |

Table A.4.5.5.4.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1, 4 | dB | 5 | -3 | -12 | -12 | -12 |
|  | Config 2, 5 |  | 5 | -3 | -12 | -12 | -12 |
|  | Config 3, 6 |  | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1, 4 | dB | -10 | -10 | 10 | 10 | 10 |
|  | Config 2, 5 |  | -10 | -10 | 10 | 10 | 10 |
|  | Config 3, 6 |  | -10 | -10 | 10 | 10 | 10 |
| CSI-RS\_RP of set q1 | Config 1, 4 | dBm/SCS | -108 | -108 | -88 | -88 | -88 |
|  | Config 2, 5 | kHz | -108 | -108 | -88 | -88 | -88 |
|  | Config 3, 6 |  | -105 | -105 | -85 | -85 | -85 |
|  | Config 1, 4 | dBm/15 KHz | -98 | | | | |
|  | Config 2, 5 |  | -98 | | | | |
|  | Config 3, 6 |  | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6. | | | | | | | |

Table A.4.5.5.4.1-4: Void

Table A.4.5.5.4.1-5: Void

Table A.4.5.5.4.1-6: Void

図形

低い精度で自動的に生成された説明

**Figure A.4.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

##### A.4.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 1920+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.5 EN-DC Beam Failure Detection and Link Recovery Test for FR1 SCell configured with CSI-RS-based BFD and SSB-based LR in non-DRX mode

A.4.5.5.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving SCell and that the UE performs correct SSB-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell without *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.5.1-1, A.4.5.5.5.1-2, and A.4.5.5.5.1-3 below. There are three cells, cell 1 is the E-UTRAN PCell, cell 2 is the PSCell and cell 3 is the SCell, in the test. UE is not provided by *schedulingRequestID-BFR-SCell-r16*, i.e., no configuration for PUCCH transmission resources, and UE shall perform the random access procedure to recover the beam failure. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.5.1-1 shows the SNR of the CSI-RS in set q0 in the active SCell to emulate beam failure. Figure A.4.5.5.5.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1, cell 2 and cell3. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. In the test, DRX configuration is not enabled.

**Table A.4.5.5.5.1-1: Supported test configurations for FR1 PCell and SCell**

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

**Table A.4.5.5.5.1-2: General test parameters for FR1 SCell for beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** | **Comment** |
|  | | |  | **Test 1** |  |
| Active PCell | | |  | Cell 1 |  |
| RF Channel Number | | |  | 1 |  |
| Active PSCell | | |  | Cell 2 |  |
| RF Channel Number | | |  | 2 |  |
| Active SCell | | |  | Cell 3 |  |
| RF Channel Number | | |  | 3 |  |
| Duplex mode | | Config 1, 4 |  | FDD |  |
|  | | Config 2, 3, 5, 6 |  | TDD |  |
| BWchannel | | Config 1, 4 | MHz | 10: NRB,c = 52 |  |
|  | | Config 2, 5 |  | 10: NRB,c = 52 |  |
|  | | Config 3, 6 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |  |
| TDD Configuration | | Config 1, 4 |  | Not Applicable |  |
|  | | Config 2, 5 |  | TDDConf.1.1 |  |
|  | | Config 3, 6 |  | TDDConf.2.1 |  |
| CORESET | | Config 1, 4 |  | CR.1.1 FDD | A.3.1.2 |
| Reference Channel | | Config 2, 5 |  | CR.1.1 TDD |  |
|  | | Config 3, 6 |  | CR.2.1 TDD |  |
| SSB Configuration | | Config 1, 4 |  | SSB.1 FR1 | A.3.10 |
|  | | Config 2, 5 |  | SSB.1 FR1 |  |
|  | | Config 3, 6 |  | SSB.2 FR1 |  |
| SMTC | | Config 1, 2, 4, 5 |  | SMTC.1 | A.3.11 |
| Configuration | | Config 3, 6 |  | SMTC.1 |  |
| PDSCH/PDCCH | | Config 1, 2, 4, 5 |  | 15 KHz |  |
| subcarrier spacing | | Config 3, 6 |  | 30 KHz |  |
| PRACH Configuration | | Config 1, 2, 4, 5 |  | Table A.3.8.2.1-1 |  |
| Config 3, 6 |  | Table A.3.8.2.1-1 |  |
| csi-RS-Index assigned as beam failure detection RS in set q0 in activated SCell | | |  | 0 |  |
| OCNG parameters | | |  | OP.1 | A.3.2.1 |
| CP length | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |  |
| Beam failure | | DCI format |  | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols |  | 2 |  |
|  | | Aggregation level | CCE | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
|  | | DMRS precoder granularity |  | REG bundle size |  |
|  | | REG bundle size |  | 6 |  |
| DRX | | |  | OFF |  |
| Gap pattern ID | | |  | N.A. |  |
| schedulingRequestID-BFR-SCell-r16 | | |  | absent | When the field is absent, the random access procedure will be triggered for SCell BFR |
| SSB Index assigned as CBD RS (q1) in activated SCell | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp- | Config 1, 2, 4, 5 | | dBm/SCS | -98 | Threshold used |
| ThresholdSSB | Config 3, 6 | | kHz | -95 | for Qin\_LR\_SSB |
| powerControlOffsetSS | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS | | Config 1, 4 |  | CSI-RS.1.2 FDD | A.3.14 |
| configuration for q0 | | Config 2, 5 |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 |  | CSI-RS.2.2 TDD |  |
| CSI-RS | | Config 1, 4 |  | CSI-RS.1.1 FDD | A.3.14 |
| configuration for | | Config 2, 5 |  | CSI-RS.1.1 TDD |  |
| CSI reporting | | Config 3, 6 |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | Config 1, 4 |  | TRS.1.1 FDD |  |
|  | | Config 2, 5 |  | TRS.1.1 TDD |  |
|  | | Config 3, 6 |  | TRS.1.2 TDD |  |
| csi-RS-Index | | Config 1, 4 |  | CSI-RS.1.2 FDD | A.3.14 |
| assigned as RLM | | Config 2, 5 |  | CSI-RS.1.2 TDD |  |
| RS | | Config 3, 6 |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | ms | 1000 |  |
| N310 | | |  | 2 |  |
| T1 | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | s | 0.18 |  |
| T3 | | | s | 0.14 |  |
| T4 | | | s | 0 |  |
| T5 | | | s | 0.17 |  |
| D1 | | | s | 0.13 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

**Table A.4.5.5.5.1-3: Cell specific test parameters for FR1 PSCell and SCell for beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell2** | **Test 1 Cell3** | | | | |
|  | |  | **T1 to T5** | **T1** | **T2** | **T3** | **T4** | **T5** |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1, 4 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
|  | Config 2, 5 |  | 5 | 5 | -3 | -12 | -12 | -12 |
|  | Config 3, 6 |  | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1, 4 | dB | -10 | -10 | -10 | 10 | 10 | 10 |
|  | Config 2, 5 |  | -10 | -10 | -10 | 10 | 10 | 10 |
|  | Config 3, 6 |  | -10 | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1, 4 | dBm/SCS kHz | -108 | -108 | -108 | -88 | -88 | -88 |
|  | Config 2, 5 |  | -108 | -108 | -108 | -88 | -88 | -88 |
|  | Config 3, 6 |  | -105 | -105 | -105 | -85 | -85 | -85 |
|  | Config 1, 4 | dBm/15 kHz | -98 | -98 | | | | |
|  | Config 2, 5 |  | -98 | -98 | | | | |
|  | Config 3, 6 |  | -98 | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | TDL-C 300ns 100Hz | | | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6]. | | | | | | | | |

グラフィカル ユーザー インターフェイス

自動的に生成された説明

**Figure A.4.5.5.5.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in non-DRX mode**

A.4.5.5.5.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 2.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble for UL-SCH resource application, followed by MAC-CE on the assigned uplink resources containing  a beam associated with the candidate beam set q1. The UE shall not transmit preamble earlier than time point B.

During T5, the System Simulator shall transmit a Random Access Response to UE after the System Simulator receives the preamble from UE. The UE shall transmit the msg.3 containing candidate beam set q1 for SCell BFR if UE receives the Random Access Response.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.6 EN-DC Beam Failure Detection and Link Recovery Test for FR1 SCell configured with CSI-RS-based BFD and SSB-based LR in DRX mode

A.4.5.5.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS based beam failure in the set q0 configured for a serving SCell and that the UE performs correct SSB-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell without *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.6.1-1, A.4.5.5.6.1-2, and A.4.5.5.6.1-3below. There are three cells, cell 1 is the E-UTRAN PCell, cell 2 is the PSCell and cell 3 is the SCell, in the test. UE is not provided by *schedulingRequestID-BFR-SCell-r16*, i.e., no configuration for PUCCH transmission resources, and UE shall perform the random access procedure to recover the beam failure. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.6.1-1 shows the SNR of the CSI-RS in set q0 in the active SCell to emulate beam failure. Figure A.4.5.5.6.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1, cell 2 and cell 3. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled in SCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.4.5.5.6.1-1: Supported test configurations for FR1 PCell and SCell**

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

**Table A.4.5.5.6.1-2: General test parameters for FR1 SCell for beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** | **Comment** |
|  | | | |  | **Test 1** |  |
| Active PCell | | | |  | Cell 1 |  |
| RF Channel Number | | | |  | 1 |  |
| Active PSCell | | | |  | Cell 2 |  |
| RF Channel Number | | | |  | 2 |  |
| Active SCell | | | |  | Cell 3 |  |
| RF Channel Number | | | |  | 3 |  |
| Duplex mode | | | Config 1, 4 |  | FDD |  |
|  | | | Config 2, 3, 5, 6 |  | TDD |  |
| BWchannel | | | Config 1, 4 | MHz | 10: NRB,c = 52 |  |
|  | | | Config 2, 5 |  | 10: NRB,c = 52 |  |
|  | | | Config 3, 6 |  | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 |  |
| TDD Configuration | | | Config 1, 4 |  | Not Applicable |  |
|  | | | Config 2, 5 |  | TDDConf.1.1 |  |
|  | | | Config 3, 6 |  | TDDConf.2.1 |  |
| CORESET Reference | | | Config 1, 4 |  | CR.1.1 FDD | A.3.1.2 |
| Channel | | | Config 2, 5 |  | CR.1.1 TDD |  |
|  | | | Config 3, 6 |  | CR.2.1 TDD |  |
| SSB Configuration | | | Config 1, 4 |  | SSB.1 FR1 | A.3.10 |
|  | | | Config 2, 5 |  | SSB.1 FR1 |  |
|  | | | Config 3, 6 |  | SSB.2 FR1 |  |
| SMTC Configuration | | | Config 1, 2, 4, 5 |  | SMTC.1 | A.3.11 |
|  | | | Config 3, 6 |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2, 4, 5 |  | 15 KHz |  |
|  | | | Config 3, 6 |  | 30 KHz |  |
| PRACH Configuration | | | Config 1, 2, 4, 5 |  | Table A.3.8.2.1-1 |  |
| Config 3, 6 |  | Table A.3.8.2.1-1 |  |
| csi-RS-Index assigned as beam failure detection RS in set q0 in activated SCell | | | |  | 0 |  |
| OCNG parameters | | | |  | OP.1 | A.3.2.1 |
| CP length | | | |  | Normal |  |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |  |
| Beam failure detection | | | DCI format |  | 1-0 |  |
| transmission parameters | | | Number of Control OFDM symbols |  | 2 |  |
|  | | | Aggregation level | CCE | 8 |  |
|  | | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
|  | | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
|  | | | DMRS precoder granularity |  | REG bundle size |  |
|  | | | REG bundle size |  | 6 |  |
| DRX | | | |  | DRX.7 | A.3.3.7 |
| Gap pattern ID | | | |  | N.A. |  |
| schedulingRequestID-BFR-SCell-r16 | | | |  | absent | When the field is absent, the random access procedure will be triggered for SCell BFR |
| SSB Index assigned as CBD RS (q1) in activated SCell | | | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2, 4, 5 | | | dBm/SCS kHz | -98 | Threshold used |
|  | Config 3, 6 | | |  | -95 | for Qin\_LR\_SSB |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for q0 | | Config 1, 4 | |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.2 TDD |  |
| CSI-RS configuration for CSI reporting | | Config 1, 4 | |  | CSI-RS.1.1 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.1 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.1 TDD |  |
| TRS configuration | | Config 1, 4 | |  | TRS.1.1 FDD |  |
|  | | Config 2, 5 | |  | TRS.1.1 TDD |  |
|  | | Config 3, 6 | |  | TRS.1.2 TDD |  |
| csi-RS-Index assigned as RLM RS | | Config 1, 4 | |  | CSI-RS.1.2 FDD | A.3.14 |
|  | | Config 2, 5 | |  | CSI-RS.1.2 TDD |  |
|  | | Config 3, 6 | |  | CSI-RS.2.2 TDD |  |
| T310 Timer | | | | ms | 1000 |  |
| N310 | | | |  | 2 |  |
| T1 | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 8.37 |  |
| T3 | | | | s | 6.44 |  |
| T4 | | | | s | 0 |  |
| T5 | | | | s | 1.97 |  |
| D1 | | | | s | 1.93 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | |

**Table A.4.5.5.6.1-3: Cell specific test parameters for FR1 SCell for beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell2** | **Test 1 Cell3** | | | | |
|  | |  | **T1 to T5** | **T1** | **T2** | **T3** | **T4** | **T5** |
| EPRE ratio of PDCCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  |  | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1, 4 | dB | 5 | 5 | -3 | -12 | -12 | -12 |
|  | Config 2, 5 |  | 5 | 5 | -3 | -12 | -12 | -12 |
|  | Config 3, 6 |  | 5 | 5 | -3 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1, 4 | dB | -10 | -10 | -10 | 10 | 10 | 10 |
|  | Config 2, 5 |  | -10 | -10 | -10 | 10 | 10 | 10 |
|  | Config 3, 6 |  | -10 | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1, 4 | dBm/SCS kHz | -108 | -108 | -108 | -88 | -88 | -88 |
|  | Config 2, 5 |  | -108 | -108 | -108 | -88 | -88 | -88 |
|  | Config 3, 6 |  | -105 | -105 | -105 | -85 | -85 | -85 |
|  | Config 1, 4 | dBm/ 15 kHz | -98 | -98 | | | | |
|  | Config 2, 5 |  | -98 | -98 | | | | |
|  | Config 3, 6 |  | -98 | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | TDL-C 300ns 100Hz | | | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6. | | | | | | | | |

**グラフィカル ユーザー インターフェイス

自動的に生成された説明**

**Figure A.4.5.5.6.1-1: SNR and L1-RSRP variation for beam failure detection and LR testing for SCell in DRX mode**

A.4.5.5.6.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 2.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble for UL-SCH resource application, followed by MAC-CE on the assigned uplink resources containing  a beam associated with the candidate beam set q1. The UE shall not transmit preamble earlier than time point B.

During T5, the System Simulator shall transmit a Random Access Response to UE after the System Simulator receives the preamble from UE. The UE shall transmit the msg.3 containing candidate beam set q1 for SCell BFR if UE receives the Random Access Response.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.4.5.6 Active BWP switch

#### A.4.5.6.1 DCI-based and Timer-based Active BWP Switch

##### A.4.5.6.1.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.1.1.1 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.4.5.6.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.4.5.6.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.4.5.6.1.1.1-3 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.4.5.6.1.1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30kHz 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.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1. | |

Table A.4.5.6.1.1.1-2: 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 |
| *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.4.5.6.1.1.1-3.: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 |
| Frequency Range | |  | FR1 |
| Duplex mode | Config 1,4 |  | FDD |
|  | Config 2,3,5,6 |  | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable |
|  | Config 2,5 |  | TDDConf.1.1 |
|  | Config 3,6 |  | TDDConf.2.1 |
| BWchannel | Config 1,4 |  | 10 MHz: NRB,c = 52 |
|  | Config 2,5 |  | 10 MHz: NRB,c = 52 |
|  | Config 3,6 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | |  | 1, 2 |
| Initial DL BWP | Config 1,4 |  | DLBWP.0.2 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active DL BWP-1 | Config 1,4 |  | DLBWP.1.1 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active DL BWP-2 | Config 1,4 |  | DLBWP.1.3 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Initial UL BWP | Config 1,4 |  | ULBWP.0.2 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active UL BWP-1 | Config 1,4 |  | ULBWP.1.1 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active UL BWP-2 | Config 1,4 |  | ULBWP.1.3 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | Config 2,5 |  | SR.1.1 TDD |
|  | Config 3,6 |  | SR.2.1 TDD |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD |
| parameters | Config 2,5 |  | CR.1.1 TDD |
|  | Config 3,6 |  | CR.2.1 TDD |
| Dedicated CORESET | Config 1,4 |  | CCR.1.2 FDD |
| parameters | Config 2,5 |  | CCR.1.2 TDD |
|  | Config 3,6 |  | CCR.2.4 TDD |
| OCNG Patterns | |  | OP.1 |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | Config 3,6 |  | SSB.2 FR1 |
| SMTC Configuration |  |  | SMTC.1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low |
| TRS Configuration | Config 1,4 |  | TRS.1.1 FDD |
|  | Config 2,5 |  | TRS.1.1 TDD |
|  | Config 3,6 |  | 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 | 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 1,2,4,5 | dBm/SCS | [-104] |
|  | Config 3,6 |  | [-101] |
| NocNote 2 | | dBm/15kHz | -104 |
| SS-RSRP Note 3 | Config 1,2,4,5 | dBm/SCS | [-87] |
|  | Config 3,6 |  | [-90] |
| Ês/Iot | | dB | 17 |
| Ês/Noc | | dB | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | [-59] |
|  | Config 3,6 | dBm/38.16MHz | [-61.9] |
| Propagation Condition | |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | |

A.4.5.6.1.1.2 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.4.5.6.1.2 E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC

A.4.5.6.1.2.1 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.4.5.6.1.2.1-1.

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.4.5.6.1.2.1-2. 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.4.5.6.1.2.1-3 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) and SCell (Cell 3) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 3 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 SCell, BWP-1 and BWP-2, in Cell 3 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 PSCell, BWP-0 in Cell 2 before starting the test.

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

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

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

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell’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 SCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell no later than at the beginning of the DL slot right after slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on SCell’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.

PSCell(Cell 2) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on SCell(Cell 3).

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 SCell’s DL slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell at latest at the beginning of the DL slot right after slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on SCell’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 SCell shall occur within the BWP switch delay.

PSCell(Cell 2) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell 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 PSCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during BWP switch of SCell, respectively.

Table A.4.5.6.1.2.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30kHz 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.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.  Note 3: NR configuration is the same for PSCell and SCells.  Note 4: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration | |

Table A.4.5.6.1.2.1-2: 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 |  |
| *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. |
| 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.4.5.6.1.2.1-3: 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 1,4 |  | FDD | |
|  | Config 2,3,5,6 |  | TDD | |
| TDD configuration | Config 1,4 |  | Not Applicable | |
|  | Config 2,5 |  | TDDConf.1.1 | |
|  | Config 3,6 |  | TDDConf.2.1 | |
| BWchannel | Config 1,4 |  | Note 7 | |
|  | Config 2,5 |  | Note 7 | |
|  | Config 3,6 |  | Note 7 | |
| BWoccupied | Config 1,4 | RB | 52 Note 5 | |
| Config 2,5 | 52 Note 5 | |
| Config 3,6 | 106 Note 6 | |
| Active BWP ID | |  | 0 | 1.2 |
| Initial BWP | Config 1,4 |  | DLBWP.0.2 | DLBWP.0.2 |
| Configuration | Config 2,5 |  |  |  |
|  | Config 3,6 |  |  |  |
| Active BWP-0 | Config 1,4 |  | DLBWP.0.2 | N.A. |
| Configuration | Config 2,5 |  |  |  |
|  | Config 3,6 |  |  |  |
| Active BWP-1 | Config 1,4 |  | N.A. | DLBWP.1.3 |
| Configuration | Config 2,5 |  |  |  |
|  | Config 3,6 |  |  |  |
| Active BWP-2 | Config 1,4 |  | N.A. | DLBWP.1.1 |
| Configuration | Config 2,5 |  |  |  |
|  | Config 3,6 |  |  |  |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD | |
| measurement channel | Config 2,5 |  | SR.1.1 TDD | |
|  | Config 3,6 |  | SR2.1 TDD | |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD | |
| parameters | Config 2,5 |  | CR.1.1 TDD | |
|  | Config 3,6 |  | CR2.1 TDD | |
| Dedicated CORESET | Config 1,4 |  | CCR.1.2 FDD | |
| parameters | Config 2,5 |  | CCR.1.2 TDD | |
|  | Config 3,6 |  | CCR.2.4 TDD | |
| OCNG Patterns | Config 1,2,4,5 |  | OP.1 Note 5 | |
| Config 3,6 |  | OP.1 Note 6 | |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 | |
|  | Config 3,6 |  | SSB.2 FR1 | |
| SMTC Configuration | |  | SMTC.1 | |
| TRS Configuration | Config 1,4 |  | TRS.1.1 FDD | |
|  | Config 2,5 |  | TRS.1.1 TDD | |
|  | Config 3,6 |  | TRS.1.2 TDD | |
| 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 | | 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 1,2,4,5 | dBm/9.36MHz | [-59] | [-59] |
|  | Config 3,6 | dBm/38.16MHz | [-61.9] | [-61.9] |
| 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 within BWoccupied.  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: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | |

A.4.5.6.1.2.2 Test Requirements

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

During T3, the UE shall start to send the ACK for SCell on 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 SCell 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 SCell active BWP switch shall not happen outside the BWP switch delay.

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

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

The interruption of PSCell 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.4.5.6.2 RRC-based Active BWP Switch

A.4.5.6.2.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.2.1.1 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.4.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2) as given in Table A.4.5.6.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell are specified in Table A.4.5.6.2.1.1-3 below.

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

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.4.5.6.2.1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30kHz 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 | |

**Table A.4.5.6.2.1.1-2: 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 |  |
| 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.4.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 |
| Frequency Range | | |  | FR1 |
| Duplex mode | | Config 1,4 |  | FDD |
|  | | Config 2,3,5,6 |  | TDD |
| TDD configuration | | Config 1,4 |  | Not Applicable |
|  | | Config 2,5 |  | TDDConf.1.1 |
|  | | Config 3,6 |  | TDDConf.2.1 |
| BWchannel | | Config 1,4 |  | 10 MHz: NRB,c = 52 |
|  | | Config 2,5 |  | 10 MHz: NRB,c = 52 |
|  | | Config 3,6 |  | 40 MHz: NRB,c = 106 |
| Active DL BWP ID | | |  | 1, 2 |
| Initial DL BWP | | Config 1,4 |  | DLBWP.0.2 |
| Configuration | | Config 2,5 |  |  |
|  | | Config 3,6 |  |  |
| Initial UL BWP | | Config 1,4 |  | ULBWP.0.2 |
| Configuration | | Config 2,5 |  |  |
|  | | Config 3,6 |  |  |
| Initial | Active DL | Config 1,4 |  | DLBWP.1.3 |
| Condition | BWP-1 | Config 2,5 |  |  |
|  | Configuration | Config 3,6 |  |  |
|  | Active UL | Config 1,4 |  | ULBWP.1.3 |
|  | BWP-1 | Config 2,5 |  |  |
|  | Configuration | Config 3,6 |  |  |
| Final | Active DL | Config 1,4 |  | DLBWP.1.1 |
| Condition | BWP-1 | Config 2,5 |  |  |
|  | Configuration | Config 3,6 |  |  |
|  | Active UL | Config 1,4 |  | ULBWP.1.1 |
|  | BWP-1 | Config 2,5 |  |  |
|  | Configuration | Config 3,6 |  |  |
| Initial UL BWP | | Config 1,4 |  | ULBWP.0.2 |
| Configuration | | Config 2,5 |  |  |
|  | | Config 3,6 |  |  |
| Active UL BWP-1 | | Config 1,4 |  | ULBWP.1.3 |
| Configuration | | Config 2,5 |  |  |
|  | | Config 3,6 |  |  |
| Active UL BWP-2 | | Config 1,4 |  | ULBWP.1.1 |
| Configuration | | Config 2,5 |  |  |
|  | | Config 3,6 |  |  |
| PDSCH Reference | | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | | Config 2,5 |  | SR.1.1 TDD |
|  | | Config 3,6 |  | SR2.1 TDD |
| RMSI CORESET | | Config 1,4 |  | CR.1.1 FDD |
| parameters | | Config 2,5 |  | CR.1.1 TDD |
|  | | Config 3,6 |  | CR2.1 TDD |
| Dedicated CORESET | | Config 1,4 |  | CCR.1.2 FDD |
| parameters | | Config 2,5 |  | CCR.1.2 TDD |
|  | | Config 3,6 |  | CCR.2.4 TDD |
| OCNG Patterns | | |  | OP.1 |
| SSB Configuration | | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | | Config 3,6 |  | SSB.2 FR1 |
| SMTC Configuration | | |  | SMTC.1 |
| TRS Configuration | | Config 1,4 |  | TRS.1.1 FDD |
|  | | Config 2,5 |  | TRS.1.1 TDD |
|  | | Config 3,6 |  | TRS.1.2 TDD |
| 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 | | | dBm/15 kHz | [-104] |
| SS-RSRP Note 3 | | | dBm/15 kHz | [-87] |
| Ês/Iot | | | dB | 17 |
| Ês/Noc | | | dB | 17 |
| IoNote3 | | Config 1,2,4,5 | dBm/9.36MHz | [-59] |
|  | | Config 3,6 | dBm/38.16MHz | [-61.9] |
| 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.4.5.6.2.1.2 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>>

<<Unchanged sections skipped>>

<<Start of change>>

#### A.4.5.7.1 Addition and Release Delay of known NR PSCell

##### A.4.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 [15] for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.4.5.7.1.1-1. 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.4.5.7.1.1-2 and cell-specific parameters in A.4.5.7.1.1-3 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 A4 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 A4. After receiving the Event A4, 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.4.5.7.1.1-1: Supported test configurations for FR1 PSCell

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

Table A.4.5.7.1.1-2: 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 |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
|  | Neighbour cell |  | Cell2 | Neighbour cell on RF channel number 2. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour Cell |  | Cell2 | PSCell released on RF channel number 2. |
| B1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event B1. |
|  | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event B1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
|  | Time to Trigger | S | 0 |  |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration on cell2 | |  | FR1 PRACH configuration 1 | Captured in A.3.8.2.1 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 1 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | 1.5 | During this time the UE shall identify neighbour cell (cell2) and report event B1. |
| T3 | | s | 0.5 | During this time the UE adds the PSCell. |
| 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. |

Table A.4.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | | | |
|  |  |  | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number |  | 1,2,3,4,5,6 | 1 | | | | |
| NR RF Channel Number |  | 1,2,3,4,5,6 | 2 | | | | |
| TDD |  | 1,4 | Not Applicable | | | | |
| configuration |  | 2,5 | TDDConf.1.1 | | | | |
|  |  | 3,6 | TDDConf.2.1 | | | | |
| BWchannel | MHz | 1,4 | 10: NRB,c = 52 | | | | |
|  |  | 2,5 | 10: NRB,c = 52 | | | | |
|  |  | 3,6 | 40: NRB,c = 106 | | | | |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 | | | | |
| PDSCH Reference |  | 1,4 | SR.1.1 FDD | | | | |
| measurement |  | 2,5 | SR.1.1 TDD | | | | |
| channel |  | 3,6 | SR.2.1 TDD | | | | |
| RMSI CORESET Reference |  | 1,4 | CR.1.1 FDD | | | | |
| Channel |  | 2,5 | CR.1.1 TDD | | | | |
|  |  | 3,6 | CR.2.1 TDD | | | | |
| Dedicated CORESET Reference |  | 1,4 | CCR.1.1 FDD | | | | |
| Channel |  | 2,5 | CCR.1.1 TDD | | | | |
|  |  | 3,6 | CCR.2.1 TDD | | | | |
| OCNG Patterns |  | 1,2,3,4,5,6 | OP.1 | | | | |
| SSB configuration |  | 1,2,4,5 | SSB.1 FR1 | | | | |
|  |  | 3,6 | SSB.2 FR1 | | | | |
| SMTC configuration |  | 1,2,4,5 | SMTC.1 | | | | |
|  |  | 3,6 | SMTC.1 | | | | |
| TRS Configuration |  | 1,4 | TRS.1.1 FDD | | | | |
|  |  | 2,5 | TRS.1.1 TDD | | | | |
|  |  | 3,6 | TRS.1.2 TDD | | | | |
| CSI-RS configuration for CSI reporting |  | 1,4 | CSI-RS.1.1 FDD | | | | |
| 2,5 | CSI-RS.1.1 TDD | | | | |
| 3,6 | CSI-RS.2.1 TDD | | | | |
| reportConfigType |  | 1,2,3,4,5,6 | periodic | | | | |
| reportQuantity |  | 1,2,3,4,5,6 | cri-RI-PMI-CQI | | | | |
| CSI reporting periodicity | slot | 1,2,4,5 | 5 | | | | |
| 3,6 | 10 | | | | |
| CSI reporting offset | slot | 1,2,4,5 | 2 | | | | |
| 3,6 | 4 | | | | |
| EPRE ratio of PSS to SSS |  |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | | | | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | dB | 1,2,3,4,5,6 | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | | | | |
| Note2 | dBm/15 kHz | 1,2,3,4,5,6 | N/A | -85 | | | |
| Note2 | dBm/SCS | 1,2,4,5 | N/A | -85 | | | |
|  |  | 3,6 | N/A | -82 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
| SS-RSRPNote3 | dBm/SCS | 1,2,4,5 | -infinity | -85 | | | |
|  |  | 3,6 | -infinity | -82 | | | |
| IoNote3 | dBm/9.36MHz | 1,2,4,5 | N/A | -57 | | | |
|  | dBm/38.1MHz | 3,6 | N/A | -51 | | | |
| Propagation condition |  | 1,2,3,4,5,6 | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

##### A.4.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell no later than 82 msNote1 from the start of 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 no later than 20ms from the start of 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 7.31.2 [15]:

Tconfig\_PSCell = TRRC\_delay + Tprocessing + Tsearch + T∆ + TPSCell\_ DU + 2ms

Where:

TRRC\_delay = 20ms

Tprocessing = 20ms

Tsearch = 0

T∆ = 20ms

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

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

## A.4A NE-DC test with all NR cells in FR1

### A.4A.x Signaling characteristics

#### A.4A.x.1 E-UTRAN PSCell addition

##### A.4A.x.1.1 Test purpose and environment

The purpose of this test is to verify that the LTE PSCell addition/release delay and interruption under NE-DC are within the requirements stated in clause 8.8 and clause 8.2.3.2.3 for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.4A.x.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1.

The test parameters for NR cell are given in Tables A.4A.x.1.1-2 and cell-specific parameters in A.4A.x.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 (NR PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (E-UTRAN 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.4A.x.1.1-1: Applicable E-UTRA and NR configurations for NE-DC PSCell addition and Release test

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.4A.x.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 NR cell and second for E-UTRAN Cell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
|  | Neighbour cell |  | Cell2 | Neighbour cell on RF channel number 2. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour Cell |  | Cell2 | PSCell released on RF channel number 2. |
| B1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event B1. |
|  | Threshold RSRP  (Config 1,2,4,5) | dBm | -96 | Actual RSRP threshold for event B1. |
|  | Threshold RSRP (Config 3,6) | dBm | -93 | Actual RSRP threshold for event B1. |
|  | Time to Trigger | S | 0 |  |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | |  | 0 | Gaps are configured before T2 and released before T3. |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 1 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | 1 | During this time the UE shall identify neighbour cell (cell2) and report event B1. |
| T3 | | s | 0.5 | During this time the UE adds the PSCell. |
| 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. |

Table A.4A.x.1.1-3: NR Cell Specific Parameters for PSCell Addition and Release

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Config | Test |
|  |  |  |
| NR RF Channel Number |  | 1,2,3,4,5,6 | 1 |
| E-UTRA RF Channel Number |  | 1,2,3,4,5,6 | 2 |
| TDD |  | 1,4 | Not Applicable |
| configuration |  | 2,5 | TDDConf.1.1 |
|  |  | 3,6 | TDDConf.2.1 |
| BWchannel | MHz | 1,4 | 10: NRB,c = 52 |
|  |  | 2,5 | 10: NRB,c = 52 |
|  |  | 3,6 | 40: NRB,c = 106 |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 |
| PDSCH Reference |  | 1,4 | SR.1.1 FDD |
| measurement |  | 2,5 | SR.1.1 TDD |
| channel |  | 3,6 | SR.2.1 TDD |
| RMSI CORESET Reference |  | 1,4 | CR.1.1 FDD |
| Channel |  | 2,5 | CR.1.1 TDD |
|  |  | 3,6 | CR.2.1 TDD |
| Dedicated CORESET Reference |  | 1,4 | CCR.1.1 FDD |
| Channel |  | 2,5 | CCR.1.1 TDD |
|  |  | 3,6 | CCR.2.1 TDD |
| OCNG Patterns |  | 1,2,3,4,5,6 | OP.1 |
| SSB configuration |  | 1,2,4,5 | SSB.1 FR1 |
|  |  | 3,6 | SSB.2 FR1 |
| SMTC configuration |  | 1,2,4,5 | SMTC.1 |
|  |  | 3,6 | SMTC.1 |
| TRS Configuration |  | 1,4 | TRS.1.1 FDD |
|  |  | 2,5 | TRS.1.1 TDD |
|  |  | 3,6 | TRS.1.2 TDD |
| CSI-RS configuration for CSI reporting |  | 1,4 | CSI-RS.1.1 FDD |
|  |  | 2,5 | CSI-RS.1.1 TDD |
|  |  | 3,6 | CSI-RS.2.1 TDD |
| reportConfigType |  | 1,2,3,4,5,6 | periodic |
| reportQuantity |  | 1,2,3,4,5,6 | cri-RI-PMI-CQI |
| CSI reporting periodicity | slot | 1,2,4,5 | 5 |
|  |  | 3,6 | 10 |
| CSI reporting offset | slot | 1,2,4,5 | 2 |
|  |  | 3,6 | 4 |
| EPRE ratio of PSS to SSS |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | dB | 1,2,3,4,5,6 | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |
| Note2 | dBm/15 kHz | 1,2,3,4,5,6 | -88 |
| Note2 | dBm/SCS | 1,2,4,5 | -88 |
|  |  | 3,6 | -85 |
|  |  | 1,2,3,4,5,6 | 0 |
|  |  | 1,2,3,4,5,6 | 0 |
| SS-RSRPNote3 | dBm/SCS | 1,2,4,5 | -88 |
|  |  | 3,6 | -85 |
| IoNote3 | dBm/9.36MHz | 1,2,4,5 | -57 |
|  | dBm/38.1MHz | 3,6 | -51 |
| Propagation condition |  | 1,2,3,4,5,6 | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | |

Table A.4A.x.1.1-4: E-UTRAN cell specific test parameters for PSCell Addition and Release tests

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | E-UTRAN Cell | | | | | |
| T1 | T2 | | T3 | T4 | T5 |
| Duplex mode |  | FDD or TDD | | | | | |
| TDD special subframe configurationNote1 |  | 6 | | | | | |
| TDD uplink-downlink configurationNote1 |  | 1 | | | | | |
| BWchannel |  | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | | | | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD  5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | | | | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD  5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | | | | | |
| OCNG PatternsNote2 |  | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD  5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | | | | | |
| PBCH\_RA | dB |  | | | | | |
| PBCH\_RB | dB |  | | | | | |
| PSS\_RA | dB |  | | | | | |
| SSS\_RA | dB |  | | | | | |
| PCFICH\_RB | dB |  | | | | | |
| PHICH\_RA | dB |  | | | | | |
| PHICH\_RB | dB | 0 | | | | | |
| PDCCH\_RA | dB |  | | | | | |
| PDCCH\_RB | dB |  | | | | | |
| PDSCH\_RA | dB |  | | | | | |
| PDSCH\_RB | dB |  | | | | | |
| OCNG\_RANote3 | dB |  | | | | | |
| OCNG\_RBNote3 | dB |  | | | | | |
| NocNote4 | dBm/15 kHz | N/A | | -104 | | | |
| Ês/Noc | dB | -infinite | | 17 | | | |
| Ês/Iot | dB | -infinite | | 17 | | | |
| RSRP Note5 | dBm/15 kHz | -infinite | | -87 | | | |
| SCH\_RP Note5 | dBm/15 kHz | -infinite | | -87 | | | |
| Io Note5 | dBm/Ch BW | N/A | | -59.13+10log(NRB,c /50) | | | |
| Propagation Condition |  | AWGN | | | | | |
| Antenna Configuration |  | 1x2 | | | | | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.  Note 3: 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 4: 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 5: Es/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

##### A.4.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 120 msNote1 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 20ms into T5.

Interruption on PCell during PSCell addition and release shall not exceed the values specified for NE-DC in Clause 8.2.3.2.3.

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 8.8 [15]:

Tconfig\_EUTRAN-PSCell = 20ms + Tactivation\_time + 50ms + TPCell\_ DU + TE-UTRAN-PSCell\_ DU

Where:

Tactivation\_time = 20ms

TPSCell\_ DU = 0ms

TE-UTRAN-PSCell\_ DU = 30ms

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

A.4A.x.x Active BWP switch

A.4A.x.x.1 E-UTRAN PSCell – NR PCell FR1 DCI-based and Timer-based DL active BWP switch in non-DRX in synchronous NE-DC

A.4A.x.x.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 7.36.2.6. Supported test configurations are shown in Table A.4A.x.x.1.1-1.

The test scenario comprises of one NR PCell (Cell 1), and one E-UTRA PSCell (Cell 2) as given in Table A.4A.x.x.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.4A.x.x.1.1-3. below, and cell-specific parameters of E-UTRA PSCell are specified in Table A.3.7.2.1-1.

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 PSCell (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 (PSCell) on radio channel 2 (PSCC).

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

- 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 at the beginning of the DL slot right after 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 at the beginning of the DL slot right after DL slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PCell’s BWP-2 starting from the beginning of the DL slot right after DL slot (*i+TBWPswitchDelay*).

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

The starting time of PSCell(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 is received.

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

**Table A.4A.x.x.1.1-1: DL BWP switch supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30kHz 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. | |

Table A.4A.x.x.1.1-2: General test parameters for DL BWP switch in synchronous NE-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| E-UTRA RF Channel Number |  | 2 | One E-UTRA 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 |
| *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 NE-DC |
| T1 | s | [0.2] |  |
| T2 | s | [0.2] |  |
| T3 | s | [0.2] |  |

**Table A.4A.x.x.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous NE-DC**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 |
| Frequency Range | |  | FR1 |
| Duplex mode | Config 1,4 |  | FDD |
|  | Config 2,3,5,6 |  | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable |
|  | Config 2,5 |  | TDDConf.1.1 |
|  | Config 3,6 |  | TDDConf.2.1 |
| BWchannel | Config 1,4 |  | 10 MHz: NRB,c = 52 |
|  | Config 2,5 |  | 10 MHz: NRB,c = 52 |
|  | Config 3,6 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | |  | 1, 2 |
| Initial DL BWP | Config 1,4 |  | DLBWP.0.2 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active DL BWP-1 | Config 1,4 |  | DLBWP.1.1 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active DL BWP-2 | Config 1,4 |  | DLBWP.1.3 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Initial UL BWP | Config 1,4 |  | ULBWP.0.2 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active UL BWP-1 | Config 1,4 |  | ULBWP.1.1 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active UL BWP-2 | Config 1,4 |  | ULBWP.1.3 Note 4 |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | Config 2,5 |  | SR.1.1 TDD |
|  | Config 3,6 |  | SR.2.1 TDD |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD |
| parameters | Config 2,5 |  | CR.1.1 TDD |
|  | Config 3,6 |  | CR.2.1 TDD |
| Dedicated CORESET | Config 1,4 |  | CCR.1.1 FDD |
| parameters | Config 2,5 |  | CCR.1.1 TDD |
|  | Config 3,6 |  | CCR.2.3 TDD |
| OCNG Patterns | |  | OP.1 |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | Config 3,6 |  | SSB.2 FR1 |
| SMTC Configuration |  |  | SMTC.1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low |
| TRS Configuration | Config 1,4 |  | TRS.1.1 FDD |
|  | Config 2,5 |  | TRS.1.1 TDD |
|  | Config 3,6 |  | 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 | 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 1,2,4,5 | dBm/SCS | [-104] |
|  | Config 3,6 |  | [-101] |
| NocNote 2 | | dBm/15kHz | -104 |
| SS-RSRP Note 3 | Config 1,2,4,5 | dBm/SCS | [-87] |
|  | Config 3,6 |  | [-90] |
| Ês/Iot | | dB | 17 |
| Ês/Noc | | dB | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | [-59] |
|  | Config 3,6 | dBm/38.16MHz | [-61.9] |
| Propagation Condition | |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | |

A.4A.x.x.1.2 Test Requirements

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

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

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

The interruption of PSCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.36.2.6.

All of the above test requirements shall be fulfilled in order for the observed PSCell 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.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

## A.4A.Y Measurement performance

### A.4A.Y.1 SFTD accuracy

#### A.4A.Y.1.1 SFTD accuracy

##### A.4A.Y.1.1.1 Test Purpose

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 10.21.1.1 for NE-DC SFTD measurements.

##### A.4A.Y.1.1.2 Test Environment

Supported test configurations are shown in Table A.4A.Y.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is NR FR1 PCell and Cell 2 is E-UTRAN target cell. The test parameters of cell 1 are given in clause A.4A.Y.1.1.2-2. The test parameters of cell 2 are given in Table A.3.7.2.1. The SFTD between PCell and target cell shall be set by the test equipment to one of the time differences in Table A.4A.Y.1.1.2-3.

Table A.4A.Y.1.1.2-1: Supported test configurations for SFTD accuracy

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

Table A.4A.Y.1.1.2-2: Test parameters for SFTD accuracy (Cell 1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Config | Unit | Test 1 |
| SSB GSCN | | 1~6 |  | freq1 |
| Duplex mode | | 1,4 |  | FDD |
|  | | 2,5 |  | TDD |
|  | | 3,6 |  | TDD |
| TDD Configuration | | 1,4 |  | N/A |
|  | | 2,5 |  | TDDConf.1.1 |
|  | | 3,6 |  | TDDConf.2.1 |
| BWchannel | | 1,4 | MHz | 10: NRB,c = 52 |
|  | | 2,5 |  | 10: NRB,c = 52 |
|  | | 3,6 |  | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | | 1,4 |  | SR.1.1 FDD |
|  | | 2,5 |  | SR.1.1 TDD |
|  | | 3,6 |  | SR.2.1 TDD |
| RMSI CORESET Reference Channel | | 1,4 |  | CR.1.1 FDD |
|  | | 2,5 |  | CR.1.1 TDD |
|  | | 3,6 |  | CR.2.1 TDD |
| RMC CORESET Reference Channel | | 1,4 |  | CCR.1.1 FDD |
|  | | 2,5 |  | CCR.1.1 TDD |
|  | | 3,6 |  | CCR.2.1 TDD |
| SSB configuration | | 1,4 |  | SSB.1 FR1 |
|  | | 2,5 |  | SSB.1 FR1 |
|  | | 3,6 |  | SSB.2 FR1 |
| SMTC configuration | | 1~6 |  | SMTC.1 |
| DL BWP configuration | | 1~6 |  | DLBWP.1.1 |
| UL BWP configuration | | 1~6 |  | ULBWP.1.1 |
| OCNG Patterns | | 1~6 |  | OP.1 |
| EPRE ratio of PSS to SSS | | 1~6 | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Note2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 1~6 | dBm/15kHz | -104 |
|  | NR\_FDD\_FR1\_B |
|  | NR\_TDD\_FR1\_C |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
|  | NR\_FDD\_FR1\_F |
|  | NR\_FDD\_FR1\_G |
|  | NR\_FDD\_FR1\_H |
| Note2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 1,2,4,5 | dBm/SSB SCS | -104 |
|  | NR\_FDD\_FR1\_B |
|  | NR\_TDD\_FR1\_C |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
|  | NR\_FDD\_FR1\_F |
|  | NR\_FDD\_FR1\_G |
|  | NR\_FDD\_FR1\_H |
|  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 3,6 | -101 |
|  | NR\_FDD\_FR1\_B |
|  | NR\_TDD\_FR1\_C |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
|  | NR\_FDD\_FR1\_F |
|  | NR\_FDD\_FR1\_G |
|  | NR\_FDD\_FR1\_H |
|  | | 1~6 | dB | -3 |
|  | | 1~6 | dB | -3 |
| SS-RSRP Note3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 1,2,4,5 | dBm/SCS | -107 |
|  | NR\_FDD\_FR1\_B |  |
|  | NR\_TDD\_FR1\_C |  |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |
|  | NR\_FDD\_FR1\_F |  |
|  | NR\_FDD\_FR1\_G |  |
|  | NR\_FDD\_FR1\_H |  |
|  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 3,6 |  | -104 |
|  | NR\_FDD\_FR1\_B |  |
|  | NR\_TDD\_FR1\_C |  |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |  |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |  |
|  | NR\_FDD\_FR1\_F |  |
|  | NR\_FDD\_FR1\_G |  |
|  | NR\_FDD\_FR1\_H |  |
| Io Note3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 1,2,4,5 | dBm/9.36 MHz | -74.28 |
|  | NR\_FDD\_FR1\_B |
|  | NR\_TDD\_FR1\_C |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
|  | NR\_FDD\_FR1\_F |
|  | NR\_FDD\_FR1\_G |
|  | NR\_FDD\_FR1\_H |
|  | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 3,6 | dBm/38.16 MHz | -68.18 |
|  | NR\_FDD\_FR1\_B |
|  | NR\_TDD\_FR1\_C |
|  | NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D |
|  | NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E |
|  | NR\_FDD\_FR1\_F |
|  | NR\_FDD\_FR1\_G |
|  | NR\_FDD\_FR1\_H |
| Propagation condition | | 1~6 |  | AWGN |
| Antenna configuration | | 1~6 |  | 1x2 |
| 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: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification | | | | |

Table A.4A.Y.1.1.2-3: Timing offsets for SFTD accuracy test

|  |  |  |
| --- | --- | --- |
| Configuration | SFN offset between PCell and PSCell | Frame boundary offset between PCell and PSCell (Ts) |
| 1 | 100 | -122000 |
| 2 | 300 | -60540 |
| 3 | 500 | 1000 |
| 4 | 700 | 62540 |
| 5 | 900 | 124000 |

##### A.4A.Y.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and E-UTRAN target cell. The reported SFTD accuracy shall fulfil the requirement in clause 10.1.21.1.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

Table A.5.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | **Comments** |
| SSB Configuration | Config 1,2 |  | SSB.1 FR2 | As defined in A.3.10 |
| CSI-RS for tracking | Config 1,2 |  | TRS.2.1 TDD |  |
| Duplex Mode for Cell 2 | Config 1,2 |  | TDD |  |
| TDD Configuration | Config 1,2 |  | TDDConf.3.1 |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 24 |  |
| OCNG Pattern Note 1 | |  | OP.3 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1,2 |  | SR.3.1 TDD | As defined in A.3.1.1. |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | As defined in A.3.1.2 |
| Dedicated CORESET Reference Channel | Config 1,2 |  | CCR.3.1 TDD |  |
| 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 |  |  |
| ss-PBCH-BlockPower | | dBm/ SCS | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power () | | dBm | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| PRACH Configuration | |  | FR2 PRACH configuration 1 | As defined in A.3.8.3, with exceptions as defined below. |
| rsrp-ThresholdSSB | | dBm | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| preambleReceivedTargetPower | | dBm | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that 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: 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 3: The ΔUL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

Table A.5.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Test-2 | **Comments** |
| SSB Configuration | Config 1,2 |  | SSB.1 FR2 | SSB.1 FR2 | As defined in A.3.10 |
| CSI-RS Configuration | Config 1,2 |  | N/A | CSI-RS.3.1 TDD | As defined in A.3.1.4 |
| CSI-RS for tracking | Config 1,2 |  | TRS.2.1 TDD | TRS.2.1 TDD |  |
| Duplex Mode for Cell 2 | Config 1,2 |  | TDD | TDD |  |
| TDD Configuration | Config 1,2 |  | TDDConf.3.1 | TDDConf.3.1 |  |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 24 | 100: NRB,c = 24 |  |
| OCNG Pattern Note 1 | |  | OCNG pattern 1 | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1,2 |  | SR3.1 TDD | SR3.1 TDD | As defined in A.3.1.1. |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | CR.3.1 TDD | As defined in A.3.1.2 |
| Dedicated CORESET Reference Channel | Config 1,2 |  | CCR.3.1 TDD | CCR.3.1 TDD |  |
| NR RF Channel Number | |  | 1 | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 | 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 |  |  |  |
| ss-PBCH-BlockPower | | dBm/ SCS | +20 +ΔUL | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power () | | dBm | maximum value configurable for certain power class | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| PRACH Configuration | |  | FR2 PRACH configuration 2 | FR2 PRACH configuration 3 | As defined in A.3.8.3, with exceptions as defined below |
| rsrp-ThresholdSSB | | dBm | RSRP\_69 +ΔDL | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| preambleReceivedTargetPower | | dBm | -100 | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that 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: 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 3: The ΔUL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.5.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

*Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.*

#### A.5.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

##### A.5.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.5.5.1.1.1-1. The test parameters are given in Tables A.5.5.1.1.1-2, A.5.5.1.1.1-3, and A. 5.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.5.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.5.5.1.1.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.5.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active E-UTRA PCell | | |  | Cell 1 |
| E-UTRA RF Channel Number | | |  | 1 |
| Active PSCell | | |  | Cell 2 |
| RF Channel Number | | |  | 2 |
| Duplex mode | | Config 1, 2 |  | TDD |
| BWchannel | | Config 1, 2 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1, 2 |  | 24 |
| DL initial BWP configuration | | Config 1, 2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1, 2 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1, 2 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2 |  | 0,1 |
| OCNG parameters | | |  | OP.5 |
| CP length | | |  | Normal |
| Out of sync | DCI format | |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | *gp0* |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1, 2 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1, 2 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 9.68 |
| T3 | | | s | 9.68 |
| D1 | | | s | 9.64 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | |

Table A.5.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | |
|  | |  | AoA1 | | | AoA2 | | |
| Assumption for UE beamsNote 5 | |  | Rough | | | Rough | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | |  | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |  | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | Not sent | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |  | | |
| ssb-Index 0 SNR | Config 1, 2 | dB | 2Note 6 | -6Note 6 | -15 |  | | |
| ssb-Index 1 SNR | Config 1, 2 |  | Not sent | | | 2Note 6 | -15 | -15 |
|  | Config 1, 2 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.5.5.1.1.1-2 | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | TDL-A 30ns 75Hz | | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | |

Table A.5.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
|  | Value |
| gapOffset | 0 |
| Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap). | |

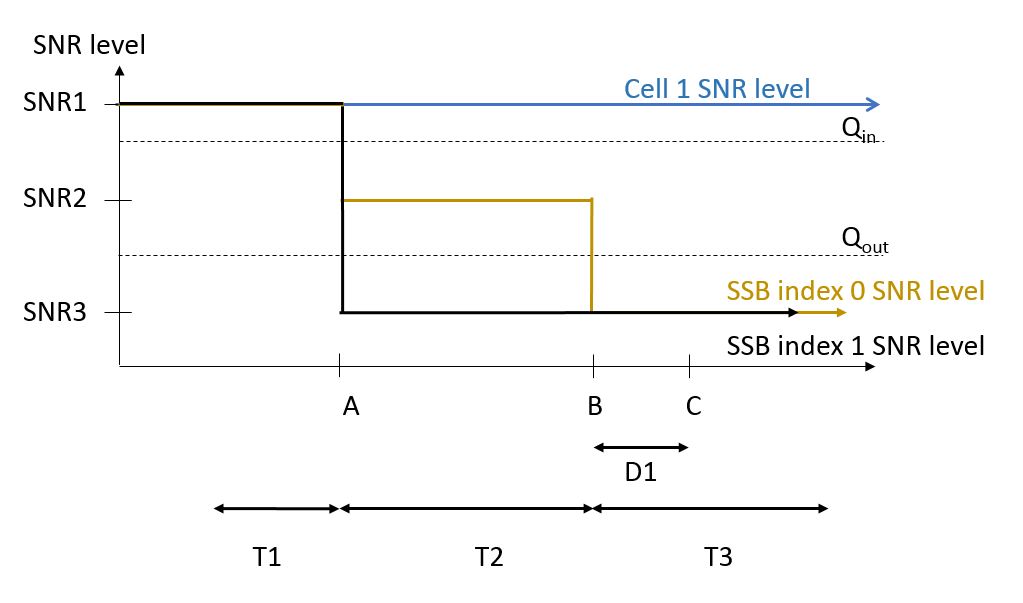


Figure A.5.5.1.1.1-1: SNR variation for out-of-sync testing



Figure A.5.5.1.1.1-2: Time multiplexed downlink transmissions

##### A.5.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

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

#### A.5.5.1.2 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

##### A.5.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.5.5.1.2.1-1. The test parameters are given in Tables A.5.5.1.2.1-2, and A.5.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.5.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms.

Table A.5.5.1.2.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.5.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active E-UTRA PCell | | |  | Cell 1 |
| E-UTRA RF Channel Number | | |  | 1 |
| Active PSCell | | |  | Cell 2 |
| RF Channel Number | | |  | 2 |
| Duplex mode | | Config 1, 2 |  | TDD |
| BWchannel | | Config 1, 2 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1, 2 |  | 24 |
| DL initial BWP configuration | | Config 1, 2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1, 2 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1, 2 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2 |  | 0,1 |
| OCNG parameters | | |  | OP. 5 |
| CP length | | |  | Normal |
| In sync | DCI format | |  | 1-0 |
| transmission | Number of Control OFDM symbols | |  | 2 |
| parameters | Aggregation level | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| Out of sync | DCI format | |  | 1-0 |
| transmission | Number of Control OFDM symbols | |  | 2 |
| parameters | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | 4000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1, 2 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1, 2 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 1.88 |
| T4 | | | s | 0.2 |
| T5 | | | s | 3.84 |
| D1 | | | s | 3.8 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | |

Table A.5.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | | | | | |
| T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
| AoA1 | | | | | AoA2 | | | | |
| Assumption for UE beamsNote 5 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |  | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | Not sent | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |  | | | | |
| ssb-Index 0 SNR | Config 1, 2 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |  | | | | |
| ssb-Index 1 SNR | Config 1, 2 |  | Not sent | | | | | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1, 2 | dBm/ 15KHz | -92.1 | | | | | -92.1 | | | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.5.5.1.2.1-2 | | | | | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | | | | | |

Table A.5.5.1.2.1-4: Void

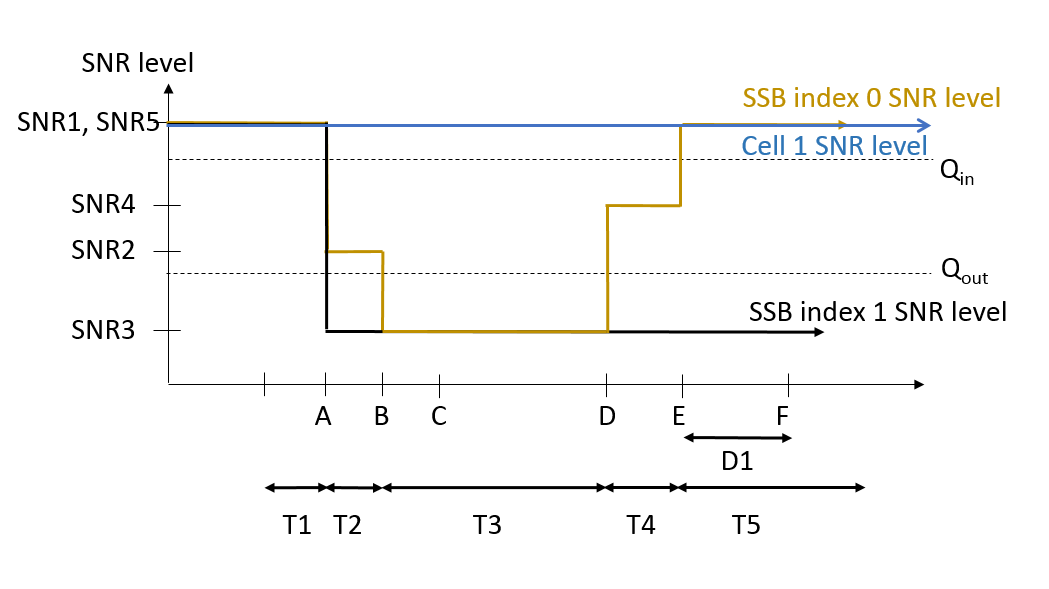


Figure A.5.5.1.2.1-1: SNR variation for in-sync testing



Figure A.5.5.1.2.1-2: Time multiplexed downlink transmissions

##### A.5.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.5.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

##### A.5.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.5.5.1.3.1-1. The test parameters are given in Tables A.5.5.1.3.1-2, and A.5.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.5.5.1.3.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.5.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active E-UTRA PCell | | |  | Cell 1 |
| E-UTRA RF Channel Number | | |  | 1 |
| Active PSCell | | |  | Cell 2 |
| RF Channel Number | | |  | 2 |
| Duplex mode | | Config 1, 2 |  | TDD |
| BWchannel | | Config 1, 2 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1, 2 |  | 66 |
| DL initial BWP configuration | | Config 1, 2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1, 2 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1, 2 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2 |  | 0,1 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Out of sync | DCI format | |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX Configuration | | |  | DRX.3 |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1, 2 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1, 2 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 14.48 |
| T3 | | | s | 14.48 |
| D1 | | | s | 14.44 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | |

Table A.5.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | |
| Assumption for UE beamsNote 5 | |  | Rough | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB | 0 | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| ssb-Index 0 SNR | Config 1, 2 | dB | 2Note 6 | -6Note 6 | -15 |
| ssb-Index 1 SNR | Config 1, 2 |  | 2Note 6 | -15 | -15 |
|  | Config 1, 2 | dBm/15KHz | -104.7dBm | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | |

Table A.5.5.1.3.1-4: Void

Table A.5.5.1.3.1-5: Void

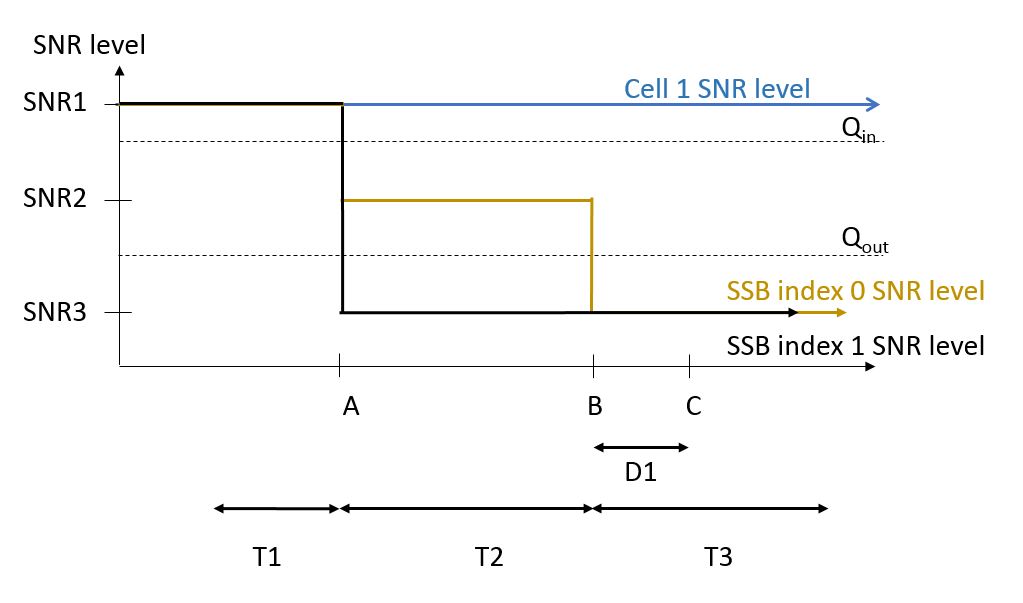


Figure A.5.5.1.3.1-1: SNR variation for out-of-sync testing

##### A.5.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

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

#### A.5.5.1.4 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

##### A.5.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.5.5.1.4.1-1. The test parameters are given in Tables A.5.5.1.4.1-2, and A.5.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.5.5.1.4.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.5.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active E-UTRA PCell | | |  | Cell 1 |
| E-UTRA RF Channel Number | | |  | 1 |
| Active PSCell | | |  | Cell 2 |
| RF Channel Number | | |  | 2 |
| Duplex mode | | Config 1, 2 |  | TDD |
| BWchannel | | Config 1, 2 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1, 2 |  | 66 |
| DL initial BWP configuration | | Config 1, 2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1, 2 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1, 2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1, 2 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1, 2 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1, 2 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 |  | 120 KHz |
| PRACH Configuration | | Config 1, 2 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1, 2 |  | 0,1 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| In sync | DCI format | |  | 1-0 |
| transmission | Number of Control OFDM symbols | |  | 2 |
| parameters | Aggregation level | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| Out of sync | DCI format | |  | 1-0 |
| transmission | Number of Control OFDM symbols | |  | 2 |
| parameters | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX Configuration | | |  | DRX.11 |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | 4000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1, 2 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1, 2 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 2.8 |
| T4 | | | s | 0.2 |
| T5 | | | s | 3.88 |
| D1 | | | s | 3.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts.  Note 3: E-UTRAN is in non-DRX mode under test. | | | | |

Table A.5.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring test in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beamsNote 5 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| ssb-Index 0 SNR | Config 1, 2 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |
| ssb-Index 1 SNR | Config 1, 2 |  | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1, 2 | dBm/15KHz | -104.7dBm | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.3  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

Table A.5.5.1.4.1-4: Void

Table A.5.5.1.4.1-5: Void

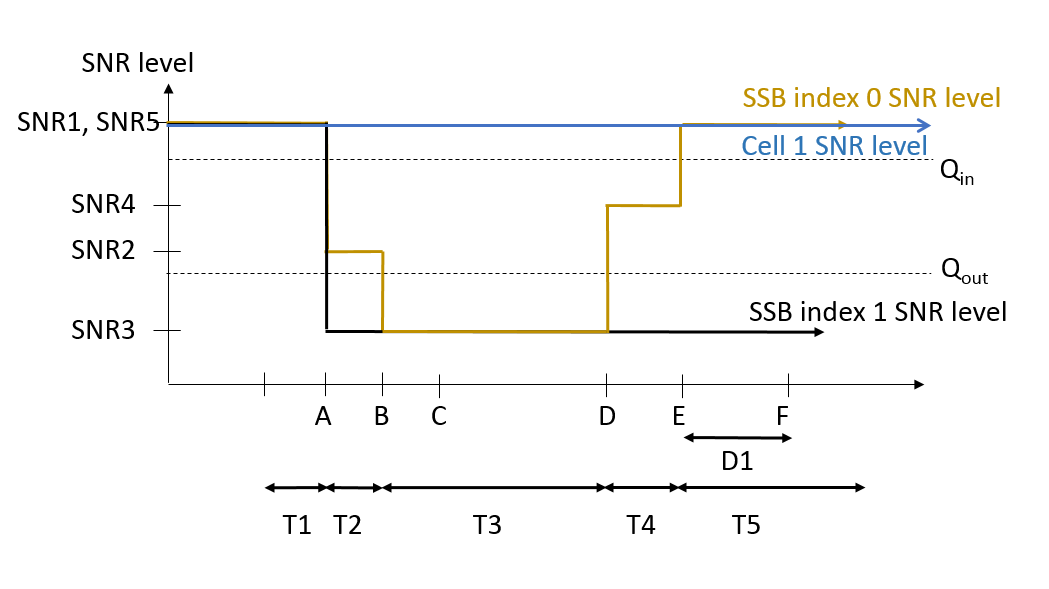


Figure A.5.5.1.4.1-1: SNR variation for in-sync testing.

##### A.5.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.5.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.5.1-1, A.5.5.1.5.1-2, A.5.5.1.5.1-3 and A.5.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.5.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.5.5.1.5.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active E-UTRA PCell | |  | Cell 1 |
| E-UTRA RF Channel Number | |  | 1 |
| Active PSCell | |  | Cell 2 |
| RF Channel Number | |  | 2 |
| Duplex Mode | |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
|  | Config 2 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1, 2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Config 2 | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.4 TDD  CCR.3.6 TDD |
| Config 2 |  | CCR.3.4 TDD  CCR.3.6 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
|  | Config 2 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
|  | Config 2 |  | SMTC.1 |
| PDSCH/PDCCH | Config 1 |  | 120 KHz |
| subcarrier spacing | Config 2 |  | 120 KHz |
| CSI-RS for RLM | Config 1, 2 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.2 |
| CP length | |  | Normal |
| Out of sync | DCI format |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | *OFF* |
| Gap pattern ID | |  | *gp0* |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *0* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI | Config 1 |  | CSI-RS.3.1 TDD |
| reporting | Config 2 |  | CSI-RS.3.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.35 |
| T3 | | s | 0.35 |
| D1 | | s | 0.31 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts.  Note 2: E-UTRAN is in non-DRX mode under test. | | | |

Table A.5.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | |
|  | |  | AoA1 | | | AoA2 | | |
| Assumption for UE beamsNote 10 | |  | Rough | | | Rough | | |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | |  | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | |  | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB |  | | |  | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | |  | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB | 0 | | | Not sent | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |  | | |
| SNR on RLM-RS1 | Config 1, 2 | dB | 2Note 11 | -6Note 11 | -15 |  | | |
| SNR on RLM-RS2 | Config 1, 2 |  | Not sent | | | 2Note 11 | -14 | -15 |
|  | Config 1, 2 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | TDL-A 30ns 75Hz | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.1.5.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | |

Table A.5.5.1.5.1-3A: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
|  | Value |
| gapOffset | 0 |
| Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap) | |

Table A.5.5.1.5.1-4: Void

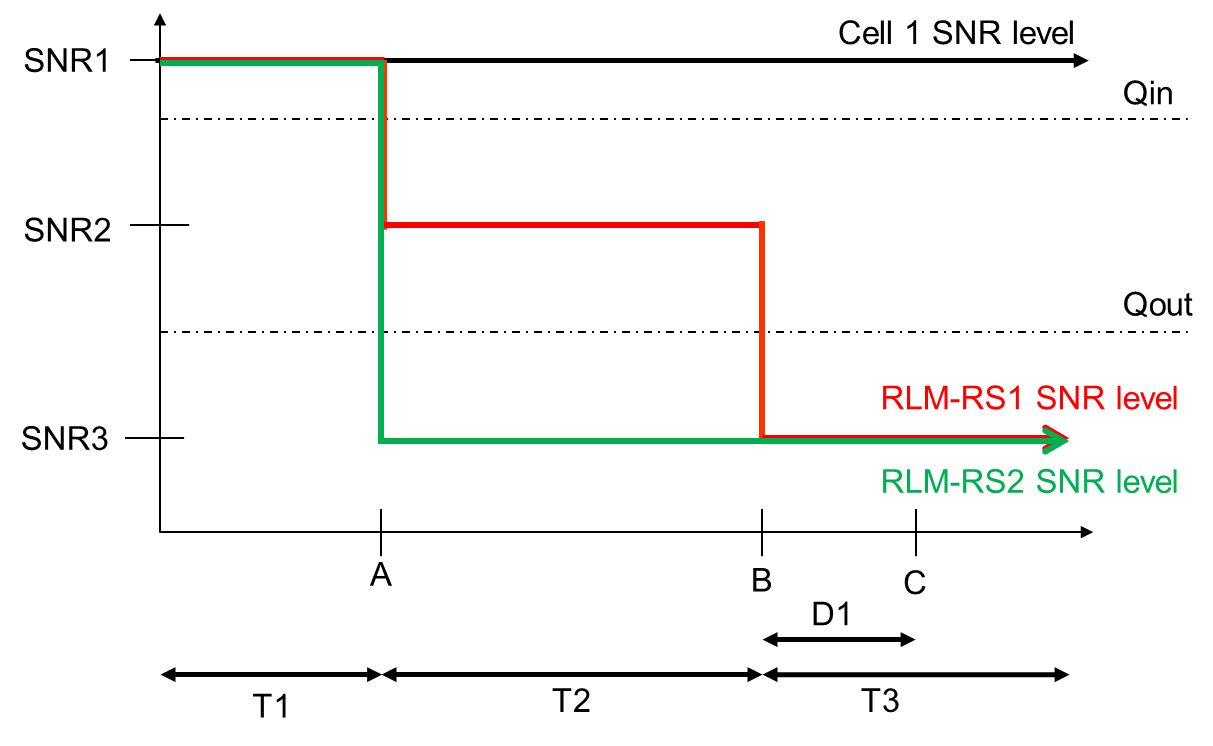
****

Figure A.5.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D1 after the start of the time duration T3) on the PSCell.

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

#### A.5.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.6.1-1, A.5.5.1.6.1-2, and A.5.5.1.6.1-3 below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.6.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.5.5.1.6.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active E-UTRA PCell | |  | Cell 1 |
| E-UTRA RF Channel Number | |  | 1 |
| Active PSCell | |  | Cell 2 |
| RF Channel Number | |  | 2 |
| Duplex Mode | |  | TDD |
| TDD | Config 1 |  | TDDConf.3.1 |
| Configuration | Config 2 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1, 2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2 |  | ULBWP.1.1 |
| RMSI CORESET Reference  Channel | Config 1 |  | CR.3.1 TDD |
| Config 2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference  Channel | Config 1 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| Config 2 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB | Config 1 |  | SSB.1 FR2 |
| Configuration | Config 2 |  | SSB.1 FR2 |
| SMTC | Config 1 |  | SMTC.1 |
| Configuration | Config 2 |  | SMTC.1 |
| PDSCH/PDCCH | Config 1 |  | 120 KHz |
| subcarrier spacing | Config 2 |  | 120 KHz |
| CSI-RS for RLM | Config 1, 2 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| OCNG parameters | |  | OP.2 |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| CP length | |  | Normal |
| Out of sync | DCI format |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| In sync | DCI format |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | *OFF* |
| Gap pattern ID | |  | N.A. |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | 1000 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI | Config 1 |  | CSI-RS.3.1 TDD |
| reporting | Config 2 |  | CSI-RS.3.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.2 |
| T3 | | s | 0.24 |
| T4 | | s | 0.2 |
| T5 | | s | 0.88 |
| D1 | | s | 0.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts.  Note 2: E-UTRAN is in non-DRX mode under test. | | | |

Table A.5.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
|  | |  | AoA1 | | | | | AoA2 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 0 | | | | |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | | | |  | | | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB |  | | | | |  | | | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | | | |  | | | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB | 0 | | | | | Not sent | | | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | | | |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |  | | | | |
| SNR on RLM-RS1 | Config 1, 2 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |  | | | | |
| SNR on RLM-RS2 | Config 1, 2 |  | Not sent | | | | | 2Note 11 | -14 | -15 | -15 | -14 |
|  | Config 1, 2 | dBm/ 15KHz | -92.1 | | | | | -92.1 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.5.5.1.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | | | | | |

Table A.5.5.1.6.1-3A: Void

Table A.5.5.1.6.1-4: Void

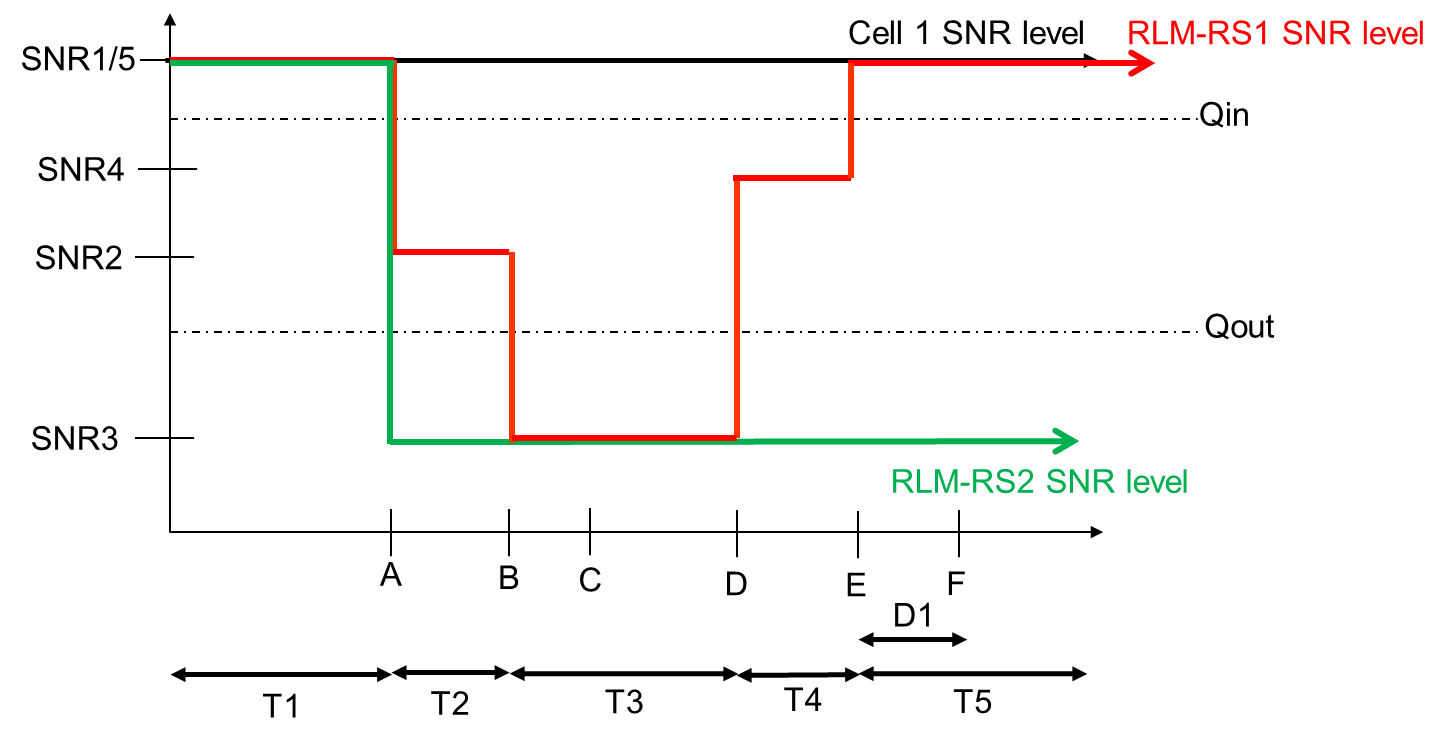
****

Figure A.5.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.5.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

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

#### A.5.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.7.1-1, A.5.5.1.7.1-2, and A.5.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.7.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.5.5.1.7.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active E-UTRA PCell | |  | Cell 1 |
| E-UTRA RF Channel Number | |  | 1 |
| Active PSCell | |  | Cell 2 |
| RF Channel Number | |  | 2 |
| Duplex Mode | |  | TDD |
| TDD | Config 1 |  | TDDConf.3.1 |
| Configuration | Config 2 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1, 2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Config 2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.4 TDD  CCR.3.6 TDD |
|  | Config 2 |  | CCR.3.4 TDD  CCR.3.6 TDD |
| SSB | Config 1 |  | SSB.1 FR2 |
| Configuration | Config 2 |  | SSB.1 FR2 |
| SMTC | Config 1 |  | SMTC.1 |
| Configuration | Config 2 | SMTC.1 |
| PDSCH/PDCCH | Config 1 |  | 120 KHz |
| subcarrier spacing | Config 2 |  | 120 KHz |
| CSI-RS for RLM | Config 1, 2 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Out of sync | DCI format |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | DRX.3 |
| Gap pattern ID | |  | N.A. |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *0* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI | Config 1 |  | CSI-RS.3.1 TDD |
| reporting | Config 2 |  | CSI-RS.3.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 1.28 |
| T3 | | s | 1.28 |
| D1 | | s | 1.24 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts.  Note 2: E-UTRAN is in non-DRX mode under test. | | | |

Table A.5.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

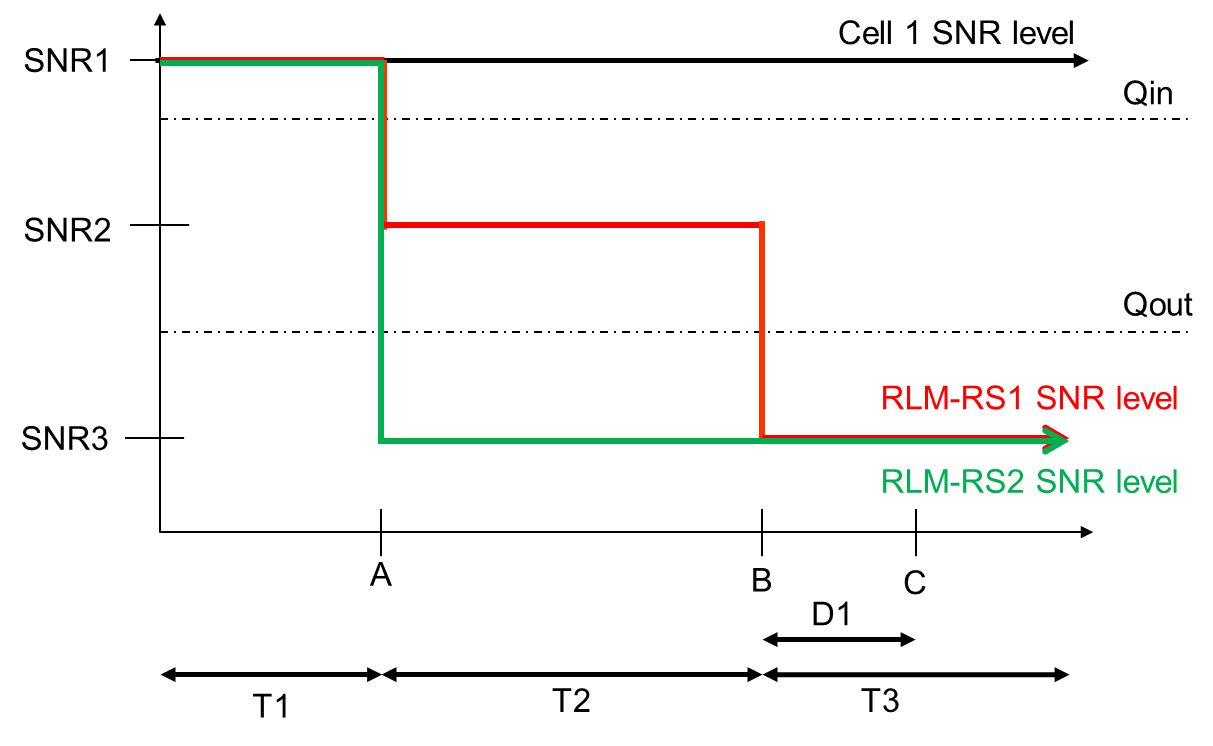
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | |
| Assumption for UE beamsNote 10 | |  | Rough | | |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB |  | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB | 0 | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on RLM-RS1 | Config 1, 2 | dB | 2Note 11 | -6Note 11 | -15 |
| SNR on RLM-RS2 | Config 1, 2 |  | 2Note 11 | -14 | -15 |
|  | Config 1 | dBm/15KHz | -104.7 | | |
|  | Config 2 |  | -104.7 | | |
| Propagation condition | |  | DL-A 30ns 75Hz | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.1.7.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | |

Table A.5.5.1.7.1-3A: Void

Table A.5.5.1.7.1-4: Void

Table A.5.5.1.7.1-5: Void

Table A.5.5.1.7.1-6: Void

****

**Figure A.5.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing**

A.5.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D1 after the start of the time duration T3) on the PSCell.

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

#### A.5.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.8.1-1, A.5.5.1.8.1-2, A.5.5.1.8.1-3 and A.5.5.1.8.1-3A below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.8.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.8.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

Table A.5.5.1.8.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active E-UTRA PCell | |  | Cell 1 |
| E-UTRA RF Channel Number | |  | 1 |
| Active PSCell | |  | Cell 2 |
| RF Channel Number | |  | 2 |
| Duplex Mode | |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
|  | Config 2 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1, 2 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Config 2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| Config 2 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
|  | Config 2 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
|  | Config 2 |  | SMTC.1 |
| PDSCH/PDCCH | Config 1 |  | 120 KHz |
| subcarrier spacing | Config 2 |  | 120 KHz |
| CSI-RS for RLM | Config 1, 2 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | CI.State.3 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Out of sync | DCI format |  | 1-0 |
| transmission parameters | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| In sync transmission | DCI format |  | 1-0 |
| parameters | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | DRX.3 |
| Gap pattern ID | |  | *gp0* |
| v | |  |  |
| T310 timer | | ms | 2000 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI | Config 1 |  | CSI-RS.3.1 TDD |
| reporting | Config 2 |  | CSI-RS.3.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.2 |
| T3 | | s | 1.64 |
| T4 | | s | 0.2 |
| T5 | | s | 1.88 |
| D1 | | s | 1.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts.  Note 2: E-UTRAN is in non-DRX mode under test. | | | |

Table A.5.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on RLM-RS1 | Config 1, 2 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |
| SNR on RLM-RS2 | Config 1, 2 | dB | 2Note 11 | -14 | -15 | -15 | -14 |
|  | Config 1, 2 | dBm/15KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.5.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

Table A.5.5.1.8.1-3A: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
|  | Value |
| gapOffset | 0 |
| Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap) | |

Table A.5.5.1.8.1-4: Void

Table A.5.5.1.8.1-5: Void

Table A.5.5.1.8.1-6: Void

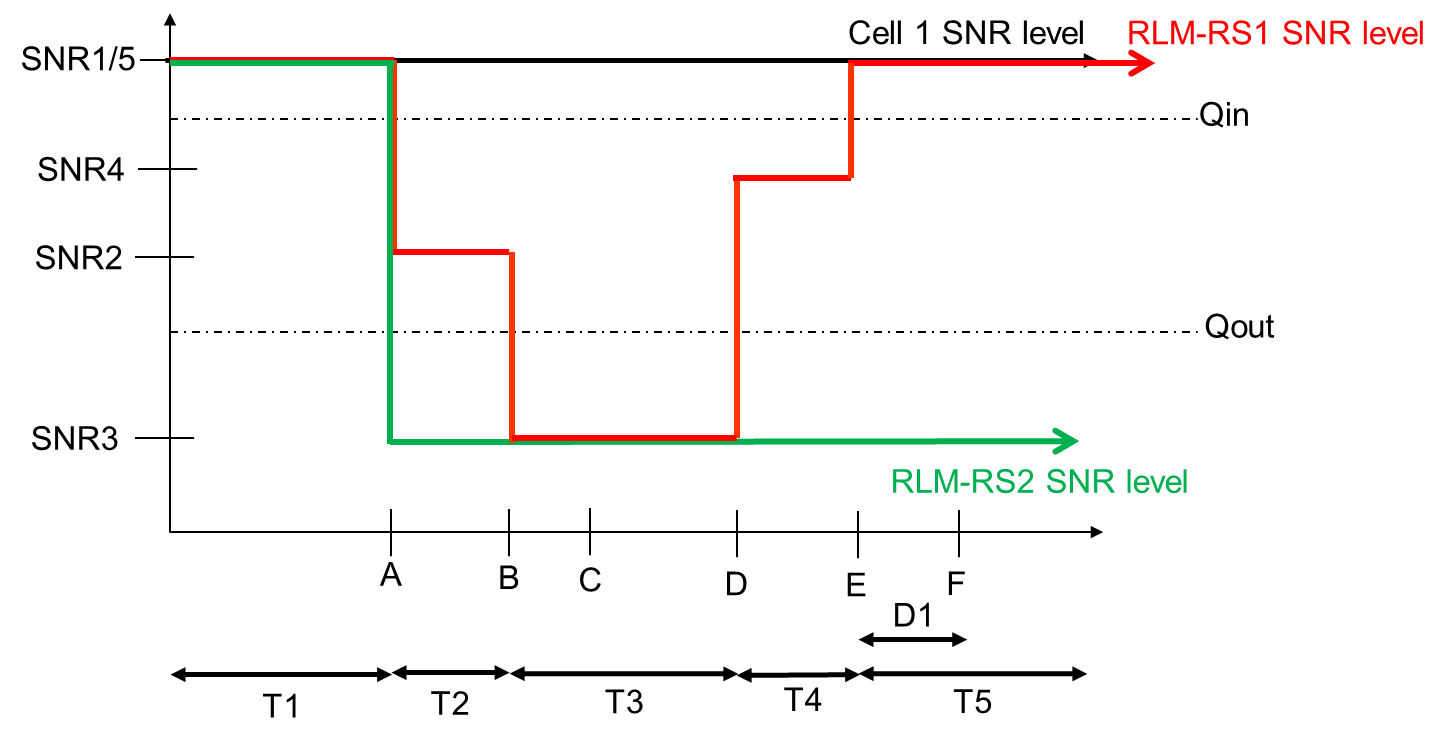
****

Figure A.5.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

##### A.5.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

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

#### A.5.5.1.9 EN-DC Radio Link Monitoring UE Scheduling Restrictions on FR2

##### A.5.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and NR FR2 PSCell (Cell 2). The test parameters for NR PSCell are given in table A.5.5.1.9.1-1, table A.5.5.1.9.1-2 and table A.5.5.1.9.1-3 below and the parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.5.5.1.9.1-1: Supported test configurations

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

Table A.5.5.1.9.1-2: General test parameters for RLM scheduling restriction test case in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| RF Channel Number |  | 1, 2 | 1 and 2 | 1 for NR PSCell and 2 for LTE PCell |
| SSB configuration |  | 1, 2 | SSB.1 FR2 |  |
| SMTC configuration |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | s | 1, 2 | OFF |  |
| T1 | s | 1, 2 | 5 | During T1 the UE is required to correctly transmit ACK/NACK |

Table A.5.5.1.9.1-3: Cell specific test parameters for RLM scheduling restriction test case in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
|  |  |  | |
| AoA setup |  | 1, 2 | Setup 3 defined in A.3.15.3 | |
|  |  | AoA1 | AoA2 |
| Assumption for UE beamsNote 1 |  |  | Rough | Rough |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1, 2 | 24 | |
| PDSCH Reference measurement channel |  | 1, 2 | SR.3.2 TDD | Not sent |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.3.1 TDD | Not sent |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.3.2 TDD | Not sent |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | TRS.2.2 TDD |
| PDCCH/PDSCH TCI state |  | 1, 2 | TCI.State.2 | Not sent |
| OCNG Pattern |  | 1, 2 | OP.5 defined in A.3.2.1 | Not sent |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | |
| RLM-RS |  | 1, 2 | SSB with index 0 | SSB with index 1 |
|  | dBm/15kHz | 1, 2 | -92.1 | -92.1 |
| Note2 | dBm/SCS | 1, 2 | -84.9 | Not sent |
|  | dB | 1, 2 | 3 | N/A |
| BB Note 4 | dB | 1, 2 | 1 | 1 |
| SSB\_RP Note3 | dBm/SCS | 1, 2 | -81.1 | -81.1 |
| Io | dBm/95.04 MHz | 1, 2 | -54.35 | -54.35 |
| Time multiplexing of the downlink transmissions from each AoA | | 1, 2 | Defined in Figure A.5.5.1.9.1-1 | |
| Propagation Condition |  | 1, 2 | AWGN | AWGN |
| Note 1: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  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: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | |



Figure A.5.5.1.9.1-1: Time multiplexed downlink transmissions

##### A.5.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.5.5.2 Interruption

#### A.5.5.2.1 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

##### A.5.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when E-UTRA PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.1.1-1.

The general test parameters are given in Table A.5.5.2.1.1-2, and NR cell specific test parameters are given in Table A.5.5.2.1.1-3 and A.5.5.2.1.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.1.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell on and Cell2 is NR FR2 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

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

Table A.5.5.2.1.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | One is E-UTRAN RF channel and the other is NR RF channel |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| CP length |  | Normal | Applicable to cell1 and cell 2 |
| DRX |  | DRX.4 | DRX related parameters are defined in Table A.3.3.4-1 |
| Measurement gap pattern Id |  | OFF |  |
| T1 | s | 10 |  |

Table A.5.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 |
| Frequency Range | |  | FR2 |
| Duplex mode | Config 1,2 |  | TDD |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | Config 1,2 |  | 66 |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD |
| TCI state | Config 1,2 |  | TCI.State.0 |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD |
| RMC CORESET Reference Channel | Config 1,2 |  | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SSB Configuration | |  | SSB.3 FR2 |
| SMTC Configuration | Config 1,2 |  | SMTC.1 |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Ês/Noc | | dB | 17 |
| Propagation Condition | |  | AWGN |
| Time offset to cell1 Note 2 | | μs | 3 |
| 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: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells | | | |

Table A.5.5.2.1.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 |
| Assumption for UE beamsNote 6 |  | Fine |
| Note1 | dBm/15kHzNote4 | -112 |
| Note1 | dBm/SCSNote3 | -102.97 |
|  | dB | 17 |
| SSB\_RPNote2 | dBm/SCS Note4 | -85.97 |
|  | dB | 17 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.90 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | |

Table A.5.5.2.1.1-5: Void

##### A.5.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

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

#### A.5.5.2.2 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

##### A.5.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.2.1-1.

The general test parameters are given in Table A.5.5.2.2.1-2, and NR cell specific test parameters are given in Table A.5.5.2.2.1-3 and A.5.5.2.2.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.2.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

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

Table A.5.5.2.2.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | One is E-UTRAN RF channel and the other is NR RF channel |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| CP length |  | Normal | Applicable to cell1 and cell 2 |
| DRX |  | DRX.6 | DRX related parameters are defined in Table A.3.3.6-1 |
| Measurement gap pattern Id |  | OFF |  |
| T1 | s | 10 |  |

Table A.5.5.2.2.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 |
| Frequency Range | |  | FR2 |
| Duplex mode | Config 1,2 |  | TDD |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | Config 1,2 |  | 66 |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD |
| TCI state | Config 1,2 |  | TCI.State.0 |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD |
| RMC CORESET Reference Channel | Config 1,2 |  | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SSB Configuration | |  | SSB.3 FR2 |
| SMTC Configuration | Config 1,2 |  | SMTC.1 |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Ês/Noc | | dB | 17 |
| Propagation Condition | |  | AWGN |
| Time offset to cell1 Note 2 | | μs | 62.5 |
| 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: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells | | | |

Table A.5.5.2.2.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 |
| Assumption for UE beamsNote 6 |  | Fine |
| Note1 | dBm/15kHzNote4 | -112 |
| Note1 | dBm/SCSNote3 | -102.97 |
|  | dB | 17 |
| SSB\_RPNote2 | dBm/SCS Note4 | -85.97 |
|  | dB | 17 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.90 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | |

Table A.5.5.2.2.1-5: Void

##### A.5.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

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

#### A.5.5.2.3 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

##### A.5.5.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.3.1-1.

The general test parameters are given in Table A.5.5.2.3.1-2, and NR cell specific test parameters are given in Table A.5.5.2.3.1-3 and A.5.5.2.3.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell 3 are NR FR2 PSCell and NR FR2 deactivated SCell, respectively. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.3.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

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

Table A.5.5.2.3.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| 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, cell 2 and cell3 |
| AoA number |  | 1 | Applicable to cell2 and cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |

Table A.5.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | Cell 3 |
| Frequency Range | |  | FR2 | FR2 |
| Duplex mode | Config 1,2 |  | TDD | TDD |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Data RBs allocated | Config 1,2 |  | 66 | 66 |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 | DLBWP.0.1 |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 | DLBWP.1.1 |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 | ULBWP.0.1 |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 | ULBWP.1.1 |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | CR.3.1 TDD |
| PDCCH CORESET parameters | Config 1,2 |  | CCR 3.1 TDD | CCR 3.1 TDD |
| OCNG Patterns | |  | OP.1 | OP.1 |
| SSB Configuration | Config 1,2 |  | SSB.1 FR2 | SSB.1 FR2 |
| SMTC Configuration | Config 1,2 |  | SMTC.1 | SMTC.1 |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD | TRS.2.1 TDD |
| TCI state | Config 1,2 |  | TCI.State.0 | TCI.State.0 |
| 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) | |
| Propagation Condition | |  | AWGN | AWGN |
| Time offset to cell1 Note 2 | | μs | 3 | 3+ Time offset to cell2 |
| Time offset to cell2 Note 3 | | μs | - | 3 |
| 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: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells  Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells | | | | |

Table A.5.5.2.3.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration | |  | Setup 1 defined in clause A.3.15.1 | |
| Assumption for UE beamsNote 6 | |  | Fine | Rough |
| Note1 | NR\_TDD\_FR2\_A | dBm/15kHz | -111.7 | -104.7 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| Note1 | NR\_TDD\_FR2\_A | dBm/SCSNote3 | -102.7 | -95.7 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| SSB\_RPNote2 | NR\_TDD\_FR2\_A | dBm/SCS Note4 | -90.7 | -90.7 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
|  | NR\_TDD\_FR2\_A | dB | 12 | 5 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| Ês/Noc | NR\_TDD\_FR2\_A | dB | 12 | 5 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| IoNote2 | NR\_TDD\_FR2\_A | dBm/95.04 MHz Note4 | -61.45 | -60.52 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

##### A.5.5.2.3.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.3.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 4 slot before an SMTC and no later than 4 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.3.2-2.

Table A.5.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (slot) |
| 3 | 0.125 | 4 |

Table A.5.5.2.3.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (slot) |
| 3 | 0.125 | 8 + SMTC duration |

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

#### A.5.5.2.4 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

##### A.5.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.4.1-1.

The general test parameters are given in Table A.5.5.2.4.1-2, and NR cell specific test parameters are given in Table A.5.5.2.4.1-3 and A.5.5.2.4.1-4 below. The E-UTRAN cell specific test parameters can be found inTable A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell 3 are NR FR2 PSCell and NR FR2 deactivated SCell, respectively. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.4.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

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

Table A.5.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | One is E-UTRAN RF channel and the other two are NR RF channel |
| 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 2. |
| CP length |  | Normal | Applicable to cell1, cell 2 and cell3 |
| AoA number |  | 1 | Applicable to cell2 and cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

Table A.5.5.2.4.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | Cell 3 |
| Frequency Range | |  | FR2 | FR2 |
| Duplex mode | Config 1,2 |  | TDD | TDD |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Data RBs allocated | Config 1,2 |  | 66 | 66 |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 | |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 | |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | CR.3.1 TDD |
| PDCCH CORESET parameters | Config 1,2 |  | CCR.3.1 TDD | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 | OP.1 |
| SSB Configuration |  |  | SSB.1 FR2 | SSB.1 FR2 |
| SMTC Configuration | Config 1,2 |  | SMTC.1 FR2 | SMTC.1 FR2 |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD | TRS.2.1 TDD |
| TCI state | Config 1,2 |  | TCI.State.0 | TCI.State.0 |
| 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) | |
| Propagation Condition | |  | AWGN | AWGN |
| Time offset to cell1 Note 2 | | μs | 62.5 | 62.5+ Time offset to cell2 |
| Time offset to cell2 Note 3 | | μs | - | 3 |
| 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: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells  Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells | | | | |

Table A.5.5.2.4.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration | |  | Setup 1 defined in clause A.3.15.1 | |
| Assumption for UE beamsNote 6 | |  | Fine | Rough |
| Note1 | NR\_TDD\_FR2\_A | dBm/15kHz | -111.7 | -104.7 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| Note1 | NR\_TDD\_FR2\_A | dBm/SCSNote3 | -102.7 | -95.7 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| SSB\_RPNote2 | NR\_TDD\_FR2\_A | dBm/SCS Note4 | -90.7 | -90.7 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
|  | | dB | 12 | 5 |
| Ês/Noc | | dB | 12 | 5 |
| IoNote2 | NR\_TDD\_FR2\_A | dBm/95.04 MHz Note4 | -61.45 | -60.52 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

##### A.5.5.2.4.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.4.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 4 slot before an SMTC and no later than 4 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.4.2-2.

Table A.5.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (slot) |
| 3 | 0.125 | 4 |

Table A.5.5.2.4.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (slot) |
| 3 | 0.125 | 8 + SMTC duration |

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

#### A.5.5.2.5 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

##### A.5.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8.2.1.2. Supported test configurations are shown in table A.5.5.2.5.1-1.

The general test parameters are given in Table A.5.5.2.5.1-2, and NR cell specific test parameters are given in Table A.5.5.2.5.1-3 and A.5.5.2.5.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 are LTE PCell and LTE deactivated SCell, respectively, and Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.5.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

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

Table A.5.5.2.5.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is NR RF channel and two are E-UTRAN 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 E-UTRAN RF channel number 3. |
| CP length |  | Normal | Applicable to cell1, cell 2 and cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

Table A.5.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E\_UTRAN SCC in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 |
| Frequency Range | |  | FR2 |
| Duplex mode | Config 1,2 |  | TDD |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | Config 1,2 |  | 66 |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD |
| PDCCH CORESET parameters | Config 1,2 |  | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SMTC Configuration | Config 1,2 |  | SMTC.1 FR2 |
| SSB Configuration | Config 1,2 |  | SSB.1 FR2 |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD |
| TCI state | Config 1,2 |  | TCI.State.0 |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Propagation Condition | |  | AWGN |
| Time offset to cell1 Note 2 | | μs | 3 |
| 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: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells | | | |

Table A.5.5.2.5.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E\_UTRAN SCC in synchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 |
| Assumption for UE beamsNote 6 |  | Fine |
| Note1 | dBm/15kHzNote4 | -112 |
| Note1 | dBm/SCSNote3 | -102.97 |
|  | dB | 17 |
| SSB\_RPNote2 | dBm/SCS Note4 | -85.97 |
|  | dB | 17 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.90 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | |

##### A.5.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.5.2-1.

Table A.5.5.2.5.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (slot) |
| 3 | 0.125 | 5 |

Table A.5.5.2.5.2-2: Void

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

#### A.5.5.2.6 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

##### A.5.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.6.1-1.

The general test parameters are given in Table A.5.5.2.6.1-2, and NR cell specific test parameters are given in Table A.5.5.2.6.1-3 and A.5.5.2.6.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 are LTE PCell and LTE deactivated SCell, respectively, and Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.6.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

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

Table A.5.5.2.6.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E\_UTRAN SCC in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is NR RF channel and two are E-UTRAN 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 E-UTRAN RF channel number 3. |
| CP length |  | Normal | Applicable to cell1, cell 2 and cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

Table A.5.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E\_UTRAN SCC in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 |
| Frequency Range | |  | FR2 |
| Duplex mode | Config 1,2 |  | TDD |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | Config 1,2 |  | 66 |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD |
| PDCCH CORESET parameters | Config 1,2 |  | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SMTC Configuration | Config 1,2 |  | SMTC.1 FR2 |
| SSB Configuration | Config 1,2 |  | SSB.1 FR2 |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD |
| TCI state | Config 1,2 |  | TCI.State.0 |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Propagation Condition | |  | AWGN |
| Time offset to cell1 Note 2 | | μs | 62.5 |
| 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: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells | | | |

Table A.5.5.2.6.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E\_UTRAN SCC in asynchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 |
| Assumption for UE beamsNote 6 |  | Fine |
| Note1 | dBm/15kHzNote4 | -112 |
| Note1 | dBm/SCSNote3 | -102.97 |
|  | dB | 17 |
| SSB\_RPNote2 | dBm/SCS Note4 | -85.97 |
|  | dB | 17 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.90 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.2.1.3, and does not limit UE implementation or test system implementation | | |

##### A.5.5.2.6.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.6.2-1.

Table A.5.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (slot) |
| 3 | 0.125 | 5 |

Table A.5.5.2.6.2-2: Void

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

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.6.3.2.1.1 Intra-frequency RRC Re-establishment in FR1

A.6.3.2.1.1.1 Test Purpose and Environment

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

The test parameters are given in table A.6.3.2.1.1.1-1, table A.6.3.2.1.1.1-2 and table A.6.3.2.1.1.1-3 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, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 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.6.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| Final condition | Active cell |  | 1, 2, 3 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3 | 1 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
| N310 | | - | 1, 2, 3 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2, 3 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2, 3 | 0 | Radio link failure timer; |
| T311 | | ms | 1, 2, 3 | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.2 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3 | OFF |  |
| PRACH configuration | |  | 1, 2, 3 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3 | 5 |  |
| T2 | | ms | 1, 2, 3 | 240 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1, 2, 3 | 2 |  |

Table A.6.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | | | Cell 2 | | | | |
|  |  |  | T1 | | T2 | | T3 | T1 | T2 | | | T3 |
| TDD configuration |  | 1 | N/A | | | | | N/A | | | | |
|  |  | 2 | TDDConf.1.1 | | | | | TDDConf.1.1 | | | | |
|  |  | 3 | TDDConf.2.1 | | | | | TDDConf.2.1 | | | | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | | | | SR.1.1 FDD | | | | |
| 2 | SR.1.1 TDD | | | | | SR.1.1 TDD | | | | |
| 3 | SR.2.1 TDD | | | | | SR.2.1 TDD | | | | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | | | | CR.1.1 FDD | | | | |
|  |  | 2 | CR.1.1 TDD | | | | | CR.1.1 TDD | | | | |
|  |  | 3 | CR.2.1 TDD | | | | | CR.2.1 TDD | | | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | | | | CCR.1.1 FDD | | | | |
|  |  | 2 | CCR.1.1 TDD | | | | | CCR.1.1 TDD | | | | |
|  |  | 3 | CCR.2.1 TDD | | | | | 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 | | | | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | | | | TRS.1.1 FDD | | | | |
| 2 | TRS.1.1 TDD | | | | | TRS.1.1 TDD | | | | |
| 3 | TRS.1.2 TDD | | | | | TRS.1.2 TDD | | | | |
| 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 | |
| RLM-RS |  | 1, 2, 3 | SSB | | | | | SSB | | | | |
|  | dB | 1 | 1.54 | | -infinity | | -infinity | -3.79 | 4 | | | 4 |
|  |  | 2 |
|  |  | 3 |
| Note2 | dBm/SCS | 1 | -98 | | | | | | | | | |
|  |  | 2 | -98 | | | | | | | | | |
|  |  | 3 | -95 | | | | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | | | | |
|  |  | 2 |  | | | | | | | | | |
|  |  | 3 |  | | | | | | | | | |
|  | dB | 1 | 7 | | -infinity | | -infinity | 4 | 4 | | | 4 |
|  |  | 2 |
|  |  | 3 |
| SS-RSRP Note3 | dBm/SCS | 1 | -91 | | -infinity | | -infinity | -94 | -94 | | | -94 |
|  |  | 2 | -91 | | -infinity | | -infinity | -94 | -94 | | | -94 |
|  |  | 3 | -88 | | -infinity | | -infinity | -91 | -91 | | | -91 |
| Io | dBm/9.36 MHz | 1 | -60.74 | | -64.59 | | -64.59 | -60.74 | -64.59 | | | -64.59 |
|  | dBm/9.36 MHz | 2 | -60.74 | | -64.59 | | -64.59 | -60.74 | -64.59 | | | -64.59 |
|  | dBm/38.16 MHz | 3 | -54.65 | | -58.50 | | -58.50 | -54.65 | -58.50 | | | -58.50 |
| 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. | | | | | | | | | | | | |

A.6.3.2.1.1.2 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 shall be less than 1.6 s.

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:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

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 = 1

Tidentify\_intra\_NR = 200 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 intra-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1545 ms, allow 1.6 s in the test case.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.6.3.2.1.2 Inter-frequency RRC Re-establishment in FR1

A.6.3.2.1.2.1 Test Purpose and Environment

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

The test parameters are given in table A.6.3.2.1.2.1-1, table A.6.3.2.1.2.1-2 and table A.6.3.2.1.2.1-3 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.6.3.2.1.2.1-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of serving cell | Description of target cell |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 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.6.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| Final condition | Active cell |  | 1, 2, 3 | Cell2 |  |
| 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 |
| N310 | | - | 1, 2, 3 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2, 3 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2, 3 | 0 | Radio link failure timer; |
| T311 | | ms | 1, 2, 3 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.2 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3 | OFF |  |
| PRACH configuration | |  | 1, 2, 3 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3 | 5 |  |
| T2 | | ms | 1, 2, 3 | 240 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1, 2, 3 | 5 |  |

Table A.6.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | | Cell 2 | | | | |
|  |  |  | T1 | | T2 | T3 | T1 | T2 | | | T3 |
| RF Channel Number |  | 1, 2, 3 | 1 | | | | 2 | | | | |
| TDD configuration |  | 1 | N/A | | | | N/A | | | | |
|  |  | 2 | TDDConf.1.1 | | | | TDDConf.1.1 | | | | |
|  |  | 3 | TDDConf.2.1 | | | | TDDConf.2.1 | | | | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | | | SR.1.1 FDD | | | | |
| 2 | SR.1.1 TDD | | | | SR.1.1 TDD | | | | |
| 3 | SR.2.1 TDD | | | | SR.2.1 TDD | | | | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | | | CR.1.1 FDD | | | | |
|  |  | 2 | CR.1.1 TDD | | | | CR.1.1 TDD | | | | |
|  |  | 3 | CR.2.1 TDD | | | | CR.2.1 TDD | | | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | | | CCR.1.1 FDD | | | | |
|  |  | 2 | CCR.1.1 TDD | | | | CCR.1.1 TDD | | | | |
|  |  | 3 | CCR.2.1 TDD | | | | 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 | | | | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | | | TRS.1.1 FDD | | | | |
| 2 | TRS.1.1 TDD | | | | TRS.1.1 TDD | | | | |
| 3 | TRS.1.2 TDD | | | | TRS.1.2 TDD | | | | |
| 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 | |
| RLM-RS |  | 1, 2, 3 | SSB | | | | SSB | | | | |
|  | dB | 1 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
|  |  | 2 |
|  |  | 3 |
| Note2 | dBm/SCS | 1 | -98 | | | | | | | | |
|  |  | 2 | -98 | | | | | | | | |
|  |  | 3 | -95 | | | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | | | |
|  |  | 2 |  | | | | | | | | |
|  |  | 3 |  | | | | | | | | |
|  | dB | 1 | 4 | | -infinity | -infinity | -infinity | -infinity | | | 7 |
|  |  | 2 |  | |  |  |  |  | | |  |
|  |  | 3 |  | |  |  |  |  | | |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -94 | | -infinity | -infinity | -infinity | -infinity | | | -91 |
|  |  | 2 | -94 | | -infinity | -infinity | -infinity | -infinity | | | -91 |
|  |  | 3 | -91 | | -infinity | -infinity | -infinity | -infinity | | | -88 |
| Io | dBm/9.36 MHz | 1 | -64.59 | | -70. 05 | -70. 05 | -70. 05 | -70. 05 | | | -62.26 |
| dBm/9.36 MHz | 2 | -64.59 | | -70. 05 | -70. 05 | -70. 05 | -70.05 | | | -62.26 |
| dBm/38.16 MHz | 3 | -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. | | | | | | | | | | | |

A.6.3.2.1.2.2 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 than 3 s.

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:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

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 = 800 ms

Tidentify\_inter\_NR = 800 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 = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.6.3.2.1.3 Intra-frequency RRC Re-establishment in FR1 without serving cell timing

A.6.3.2.1.3.1 Test Purpose and Environment

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

The test parameters are given in table A.6.3.2.1.3.1-1, table A.6.3.2.1.3.1-2 and table A.6.3.2.1.3.1-3 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, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.3.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 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.6.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell1 |  |
|  | Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| Final condition | Active cell |  | 1, 2, 3 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3 | 1 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | | 2 | 3 μs | Synchronous cells |
|  | | 3 | 3 μs | Synchronous cells |
| N310 | | - | 1, 2, 3 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1, 2, 3 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1, 2, 3 | 6000 | Radio link failure timer configured by *RLF-TimersAndConstants* |
| T311 | | ms | 1, 2, 3 | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR1 |  |
|  | | 2 | SSB.1 FR1 |  |
|  | | 3 | SSB.2 FR1 |  |
| SMTC configuration | |  | 1 | SMTC.2 |  |
|  | | 2 | SMTC.1 |  |
|  | | 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3 | OFF |  |
| PRACH configuration | |  | 1, 2, 3 | FR1 PRACH configuration 1 | Table A.3.8.2.1-1 |
| T1 | | s | 1, 2, 3 | 5 |  |
| T2 | | s | 1, 2, 3 | 6.24 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1, 2, 3 | 3 |  |

Table A.6.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1 | N/A | | | N/A | | |
|  |  | 2 | TDDConf.1.1 | | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.2.1 | | | TDDConf.2.1 | | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| 2 | SR.1.1 TDD | | | SR.1.1 TDD | | |
| 3 | SR.2.1 TDD | | | SR.2.1 TDD | | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | | CR.1.1 FDD | | |
|  |  | 2 | CR.1.1 TDD | | | CR.1.1 TDD | | |
|  |  | 3 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
|  |  | 2 | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.2.1 TDD | | | 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 | | |
|  | dB | 1 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1 | -98 | | | | | |
|  |  | 2 | -98 | | | | | |
|  |  | 3 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | |
|  |  | 2 |  | | | | | |
|  |  | 3 |  | | | | | |
|  | dB | 1 | 4 | -infinity | -infinity | -infinity | -infinity | 4 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -94 | -infinity | -infinity | -infinity | -infinity | -94 |
|  |  | 2 | -94 | -infinity | -infinity | -infinity | -infinity | -94 |
|  |  | 3 | -91 | -infinity | -infinity | -infinity | -infinity | -91 |
| Io | dBm/9.36 MHz | 1 | -64.59 | -infinity | -infinity | -infinity | -infinity | -64.59 |
|  | dBm/9.36 MHz | 2 | -64.59 | -infinity | -infinity | -infinity | -infinity | -64.59 |
|  | dBm/38.16 MHz | 3 | -58.50 | -infinity | -infinity | -infinity | -infinity | -58.50 |
| 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. | | | | | | | | |

A.6.3.2.1.3.2 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 2.2 s.

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:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

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 = 1

Tidentify\_intra\_NR = 800 ms

TSI = 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 = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2145 ms, allow 2.2 s in the test case.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.6.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means uplink signal

- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means no uplink signal.

#### A.6.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.6.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.6.5.1.1.1-1. The test parameters are given in Tables A.6.5.1.1.1-2, A.6.5.1.1.1-3, and A.6.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.6.5.1.1.1-1: Supported test configurations for FR1 PCell

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

Table A.6.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | FDD |
|  | | Config 2, 3 |  | TDD |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 |
|  | | Config 2 |  | 10: NRB,c = 52 |
|  | | Config 3 |  | 40: NRB,c = 106 |
| DL initial BWP configuration | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | Not Applicable |
|  | | Config 2 |  | TDDConf.1.1 |
|  | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.1.3 FDD |
| Config 2 |  | CCR.1.3 TDD |
| Config 3 |  | CCR.2.2 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR1 |
|  | | Config 2 |  | SSB.1 FR1 |
|  | | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | | Config 1, 2 |  | SMTC.1 |
|  | | Config 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 |  | 15 kHz |
|  | | Config 3 |  | 30 kHz |
| PRACH Configuration | | Config 1, 2 |  | Table A.3.8.2.1-1 |
|  | | Config 3 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | *gp0* |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.1.1 FDD |
|  | | Config 2 |  | CSI-RS.1.1 TDD |
|  | | Config 3 |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1 |  | TRS.1.1 FDD |
|  | | Config 2 |  | TRS.1.1 TDD |
|  | | Config 3 |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.48 |
| T3 | | | s | 0.48 |
| D1 | | | s | 0.44 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.6.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 |
|  | Config 2 |  | 1 | -7 | -15 |
|  | Config 3 |  | 1 | -7 | -15 |
|  | Config 1 | dBm/15kHz | -98 | | |
|  | Config 2 |  | -98 | | |
|  | Config 3 |  | -98 | | |
|  | Config 1 | dBm/SCS | -98 | | |
|  | Config 2 |  | -98 | | |
|  | Config 3 |  | -95 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | |
| 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: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.1.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. | | | | | |

Table A.6.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
|  | Value |
| gapOffset | 0 |
| Note: Ensure that RLM RS is partially overlapped with measurement gap | |

****

**Figure A.6.5.1.1.1-1: SNR variation for out-of-sync testing**

##### A.6.5.1.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

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

#### A.6.5.1.2 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.6.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.6.5.1.2.1-1. The test parameters are given in Tables A.6.5.1.2.1-2, and A.6.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.6.5.1.2.1-1: Supported test configurations for FR1 PCell

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

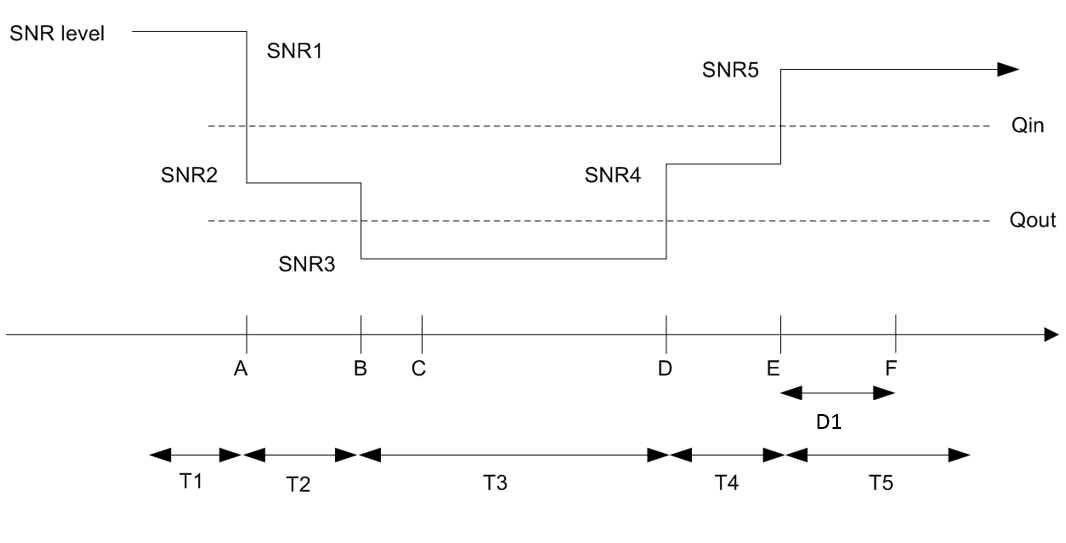
Table A.6.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value |
|  | | | |  | Test 1 |
| Active PCell | | | |  | Cell 1 |
| RF Channel Number | | | |  | 1 |
| Duplex mode | | | Config 1 |  | FDD |
|  | | | Config 2, 3 |  | TDD |
| BWchannel | | | Config 1 | MHz | 10: NRB,c = 52 |
|  | | | Config 2 |  | 10: NRB,c = 52 |
|  | | | Config 3 |  | 40: NRB,c = 106 |
| DL initial BWP configuration | | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | | Config 1 |  | Not Applicable |
|  | | | Config 2 |  | TDDConf.1.1 |
|  | | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | | Config 1 |  | CCR.1.1 FDD |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| SSB Configuration | | | Config 1 |  | SSB.1 FR1 |
|  | | | Config 2 |  | SSB.1 FR1 |
|  | | | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1, 2 |  | SMTC.1 |
|  | | | Config 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2 |  | 15 kHz |
|  | | | Config 3 |  | 30 kHz |
| PRACH Configuration | | | Config 1, 2 |  | Table A.3.8.2.1-1 |
|  | | | Config 3 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | | |  | 0 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |
| In sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| Out of sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 4 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| DRX | | | |  | *OFF* |
| Gap pattern ID | | | |  | N.A. |
| Layer 3 filtering | | | |  | *Enabled* |
| T310 timer | | | | ms | 1000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1 | |  | CSI-RS.1.1 FDD |
|  | | Config 2 | |  | CSI-RS.1.1 TDD |
|  | | Config 3 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1, 4 | |  | TRS.1.1 FDD |
|  | | Config 2, 5 | |  | TRS.1.1 TDD |
|  | | Config 3, 6 | |  | TRS.1.2 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 0.24 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 0.88 |
| D1 | | | | s | 0.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.6.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 2 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1 | dBm/15 kHz | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -98 | | | | |
|  | Config 1 | dBm/SCS | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -95 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| 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: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.2.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

**Table A.6.5.1.2.1-4: Void**

****

**Figure A.6.5.1.2.1-1: SNR variation for in-sync testing**

##### A.6.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.6.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

##### A.6.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.6.5.1.3.1-1. The test parameters are given in Tables A.6.5.1.3.1-2, and A.6.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.6.5.1.3.1-1: Supported test configurations for FR1 PCell

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

Table A.6.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | FDD |
|  | | Config 2, 3 |  | TDD |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 |
|  | | Config 2 |  | 10: NRB,c = 52 |
|  | | Config 3 |  | 40: NRB,c = 106 |
| DL initial BWP configuration | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | Not Applicable |
|  | | Config 2 |  | TDDConf.1.1 |
|  | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.1.3 FDD |
| Config 2 |  | CCR.1.3 TDD |
| Config 3 |  | CCR.2.2 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR1 |
|  | | Config 2 |  | SSB.1 FR1 |
|  | | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | | Config 1, 2 |  | SMTC.1 |
|  | | Config 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 |  | 15 kHz |
|  | | Config 3 |  | 30 kHz |
| PRACH Configuration | | Config 1, 2 |  | Table A.3.8.2.1-1 |
|  | | Config 3 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | |  | 0 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX Configuration | | |  | DRX.3 |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1 |  | CSI-RS.1.1 FDD |
|  | | Config 2 |  | CSI-RS.1.1 TDD |
|  | | Config 3 |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1 |  | TRS.1.1 FDD |
|  | | Config 2 |  | TRS.1.1 TDD |
|  | | Config 3 |  | TRS.1.2 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.68 |
| T3 | | | s | 0.68 |
| D1 | | | s | 0.64 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.6.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 |
|  | Config 2 |  | 1 | -7 | -15 |
|  | Config 3 |  | 1 | -7 | -15 |
|  | Config 1 | dBm/15kHz | -98 | | |
|  | Config 2 |  | -98 | | |
|  | Config 3 |  | -98 | | |
|  | Config 1 | dBm/SCS | -98 | | |
|  | Config 2 |  | -98 | | |
|  | Config 3 |  | -95 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | |
| 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: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.3.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. | | | | | |

Table A.6.5.1.3.1-4: Void

Table A.6.5.1.3.1-5: Void

Table A.6.5.1.3.1-6: Void

****

**Figure A.6.5.1.3.1-1: SNR variation for out-of-sync testing**

##### A.6.5.1.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

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

#### A.6.5.1.4 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

##### A.6.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.6.5.1.4.1-1. The test parameters are given in Tables A.6.5.1.4.1-2, and A.6.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.6.5.1.4.1-1: Supported test configurations for FR1 PCell

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

Table A.6.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value |
|  | | | |  | Test 1 |
| Active PCell | | | |  | Cell 1 |
| RF Channel Number | | | |  | 1 |
| Duplex mode | | | Config 1 |  | FDD |
|  | | | Config 2, 3 |  | TDD |
| BWchannel | | | Config 1 | MHz | 10: NRB,c = 52 |
|  | | | Config 2 |  | 10: NRB,c = 52 |
|  | | | Config 3 |  | 40: NRB,c = 106 |
| DL initial BWP configuration | | | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | | | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | | Config 1, 2, 3 |  | ULBWP.1.1 |
| TDD Configuration | | | Config 1 |  | Not Applicable |
|  | | | Config 2 |  | TDDConf.1.1 |
|  | | | Config 3 |  | TDDConf.2.1 |
| RMSI CORESET Reference Channel | | | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | | Config 1 |  | CCR.1.1 FDD |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| SSB Configuration | | | Config 1 |  | SSB.1 FR1 |
|  | | | Config 2 |  | SSB.1 FR1 |
|  | | | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | | | Config 1, 2 |  | SMTC.1 |
|  | | | Config 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2 |  | 15 kHz |
|  | | | Config 3 |  | 30 kHz |
| PRACH Configuration | | | Config 1, 2 |  | Table A.3.8.2.1-1 |
|  | | | Config 3 |  | Table A.3.8.2.1-1 |
| SSB index assigned as RLM RS | | | |  | 0 |
| OCNG parameters | | | |  | OP.1 |
| CP length | | | |  | Normal |
| Correlation Matrix and Antenna Configuration | | | |  | 2x2 Low |
| In sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 0 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| Out of sync transmission parameters | DCI format | | |  | 1-0 |
|  | Number of Control OFDM symbols | | |  | 2 |
|  | Aggregation level | | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | dB | 4 |
|  | DMRS precoder granularity | | |  | REG bundle size |
|  | REG bundle size | | |  | 6 |
| DRX Configuration | | | |  | DRX.3 |
| Gap pattern ID | | | |  | N.A. |
| Layer 3 filtering | | | |  | *Enabled* |
| T310 timer | | | | ms | 2000 |
| T311 timer | | | | ms | 1000 |
| N310 | | | |  | 1 |
| N311 | | | |  | 1 |
| CSI-RS configuration for CSI reporting | | Config 1 | |  | CSI-RS.1.1 FDD |
|  | | Config 2 | |  | CSI-RS.1.1 TDD |
|  | | Config 3 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1 | |  | TRS.1.1 FDD |
|  | | Config 2 | |  | TRS.1.1 TDD |
|  | | Config 3 | |  | TRS.1.2 TDD |
| T1 | | | | s | 0.2 |
| T2 | | | | s | 0.2 |
| T3 | | | | s | 0.64 |
| T4 | | | | s | 0.2 |
| T5 | | | | s | 0.88 |
| D1 | | | | s | 0.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | |

Table A.6.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
| T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 2 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1 | dBm/15 kHz | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -98 | | | | |
|  | Config 1 | dBm/SCS | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -95 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| 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: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.4.1-1.  Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

Table A.6.5.1.4.1-4: Void

Table A.6.5.1.4.1-5: Void

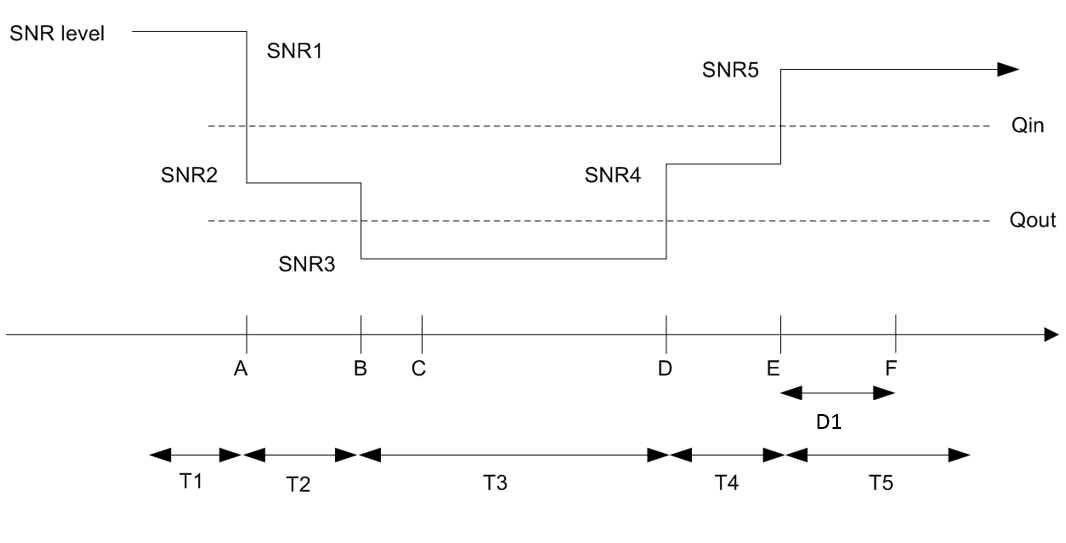
****

Figure A.6.5.1.4.1-1: SNR variation for in-sync testing.

##### A.6.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.6.5.1.5 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

##### A.6.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.5.1-1, A.6.5.1.5.1-2, A.6.5.1.5.1-3, and A.6.5.1.5.1-3A below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.5.1-1: Supported test configurations for FR1 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 2 | TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 3 | TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.6.5.1.5.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | FDD |
|  | Config 2, 3 |  | TDD |
| TDD Configuration | Config 1 |  | Not Applicable |
|  | Config 2 |  | TDDConf.1.1 |
|  | Config 3 |  | TDDConf.2.1 |
| DL initial BWP configuration | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.1.3 FDD |
| Config 2 | CCR.1.3 TDD |
| Config 3 | CCR.2.2 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR1 |
|  | Config 2 |  | SSB.1 FR1 |
|  | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | Config 1, 2 |  | SMTC.1 |
|  | Config 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2 |  | 15 kHz |
|  | Config 3 |  | 30 kHz |
| TRS configuration | Config 1 |  | TRS.1.1 FDD |
|  | Config 2 |  | TRS.1.1 TDD |
|  | Config 3 |  | TRS.1.2 TDD |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.1.1 FDD |
|  | Config 2 |  | Resource #4 in TRS.1.1 TDD |
|  | Config 3 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | |  | TCI.State. 2 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | *OFF* |
| Gap pattern ID | |  | *gp0* |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *0* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.1.1 FDD |
|  | Config 2 |  | CSI-RS.1.1 TDD |
|  | Config 3 |  | CSI-RS.2.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.48 |
| T3 | | s | 0.48 |
| D1 | | s | 0.44 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.6.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 |
|  | Config 2 |  | 1 | -7 | -15 |
|  | Config 3 |  | 1 | -7 | -15 |
|  | Config 1 | dBm/15kHz | -98 | | |
|  | Config 2 |  | -98 | | |
|  | Config 3 |  | -98 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.5.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6]. | | | | | |

Table A.6.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
| Value |
| gapOffset | 0 |
| Note 1: Void | |

Table A.6.5.1.5.1-4: Void

****

Figure A.6.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.6.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D1 ms after the start of the time duration T3) on the PCell.

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

#### A.6.5.1.6 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

##### A.6.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.6.1-1, A.6.5.1.6.1-2, and A.6.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.6.1-1: Supported test configurations for FR1 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 2 | TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 3 | TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.6.5.1.6.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | FDD |
|  | Config 2, 3 |  | TDD |
| TDD Configuration | Config 1 |  | Not Applicable |
|  | Config 2 |  | TDDConf.1.1 |
|  | Config 3 |  | TDDConf.2.1 |
| DL initial BWP configuration | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.1.1 FDD |
| Config 2 | CCR.1.1 TDD |
| Config 3 | CCR.2.1 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR1 |
|  | Config 2 |  | SSB.1 FR1 |
|  | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | Config 1, 2 |  | SMTC.1 |
|  | Config 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2 |  | 15 kHz |
|  | Config 3 |  | 30 kHz |
| TRS configuration | Config 1 |  | TRS.1.1 FDD |
|  | Config 2 |  | TRS.1.1 TDD |
|  | Config 3 |  | TRS.1.2 TDD |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.1.1 FDD |
|  | Config 2 |  | Resource #4 in TRS.1.1 TDD |
|  | Config 3 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | |  | TCI.State. 2 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| In sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | *OFF* |
| Gap pattern ID | |  | N.A. |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | 1000 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.1.1 FDD |
|  | Config 2 |  | CSI-RS.1.1 TDD |
|  | Config 3 |  | CSI-RS.2.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.2 |
| T3 | | s | 0.44 |
| T4 | | s | 0.2 |
| T5 | | s | 0.88 |
| T6 | | S | 0.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.6.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 2 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1 | dBm/15kHz | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1. | | | | | | | |

Table A.6.5.1.6.1-4: Void

****

Figure A.6.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

##### A.6.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

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

#### A.6.5.1.7 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

##### A.6.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.7.1-1, A.6.5.1.7.1-2, and A.6.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.7.1-1: Supported test configurations for FR1 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 2 | TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 3 | TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.6.5.1.7.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | FDD |
|  | Config 2, 3 |  | TDD |
| TDD Configuration | Config 1 |  | Not Applicable |
|  | Config 2 |  | TDDConf.1.1 |
|  | Config 3 |  | TDDConf.2.1 |
| DL initial BWP configuration | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.1.3 FDD |
| Config 2 | CCR.1.3 TDD |
| Config 3 | CCR.2.2 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR1 |
|  | Config 2 |  | SSB.1 FR1 |
|  | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | Config 1, 2 |  | SMTC.1 |
|  | Config 3 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2 |  | 15 kHz |
|  | Config 3 |  | 30 kHz |
| TRS configuration | Config 1 |  | TRS.1.1 FDD |
|  | Config 2 |  | TRS.1.1 TDD |
|  | Config 3 |  | TRS.1.2 TDD |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.1.1 FDD |
|  | Config 2 |  | Resource #4 in TRS.1.1 TDD |
|  | Config 3 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | |  | TCI.State. 2 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | DRX.3 |
| Gap pattern ID | |  | N.A. |
| Layer 3 filtering | |  | Enabled |
| T310 timer | | ms | 0 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.1.1 FDD |
|  | Config 2 |  | CSI-RS.1.1 TDD |
|  | Config 3 |  | CSI-RS.2.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 1.28 |
| T3 | | s | 1.28 |
| D1 | | s | 1.24 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.6.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB | 4 | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 |
|  | Config 2 |  | 1 | -7 | -15 |
|  | Config 3 |  | 1 | -7 | -15 |
|  | Config 1 | dBm/15kHz | -98 | | |
|  | Config 2 |  | -98 | | |
|  | Config 3 |  | -98 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.7.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1. | | | | | |

Table A.6.5.1.7.1-4: Void

Table A.6.5.1.7.1-5: Void

Table A.6.5.1.7.1-6: Void



Figure A.6.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.6.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D1 ms after the start of the time duration T3) on the PCell.

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

#### A.6.5.1.8 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

##### A.6.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.8.1-1, A.6.5.1.81-2, A.6.5.1.8.1-3 and A.6.5.1.8.1-3A below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.8.1-1: Supported test configurations for FR1 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 2 | TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth |
| 3 | TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

Table A.6.5.1.8.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | FDD |
|  | Config 2, 3 |  | TDD |
| TDD Configuration | Config 1 |  | Not Applicable |
|  | Config 2 |  | TDDConf.1.1 |
|  | Config 3 |  | TDDConf.2.1 |
| DL initial BWP configuration | Config 1, 2, 3 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1, 2, 3 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.1.1 FDD |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.1.1 FDD |
| Config 2 | CCR.1.1 TDD |
| Config 3 | CCR.2.1 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR1 |
|  | Config 2 |  | SSB.1 FR1 |
|  | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | Config 1, 2 |  | SMTC.1 |
|  | Config 3 | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1, 2 |  | 15 kHz |
|  | Config 3 | 30 kHz |
| TRS configuration | Config 1 |  | TRS.1.1 FDD |
|  | Config 2 |  | TRS.1.1 TDD |
|  | Config 3 |  | TRS.1.2 TDD |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.1.1 FDD |
|  | Config 2 |  | Resource #4 in TRS.1.1 TDD |
|  | Config 3 |  | Resource #4 in TRS.1.2 TDD |
| TCI configuration for PDCCH/PDSCH | |  | TCI.State. 2 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low |
| Out of sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| In sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | DRX.3 |
| Gap pattern ID | |  | gp0 |
| Layer 3 filtering | |  | Enabled |
| T310 timer | | ms | 2000 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.1.1 FDD |
|  | Config 2 |  | CSI-RS.1.1 TDD |
|  | Config 3 |  | CSI-RS.2.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.2 |
| T3 | | s | 1.24 |
| T4 | | s | 0.2 |
| T5 | | s | 1.88 |
| T6 | | s | 1.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.6.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on RLM-RS | Config 1 | dB | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 2 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 3 |  | 1 | -7 | -15 | -4.5 | 1 |
|  | Config 1 | dBm/15kHz | -98 | | | | |
|  | Config 2 |  | -98 | | | | |
|  | Config 3 |  | -98 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1. | | | | | | | |

Table A.6.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
| Value |
| gapOffset | 0 |
| Note 1: Void | |

Table A.6.5.1.8.1-4: Void

Table A.6.5.1.8.1-5: Void

Table A.6.5.1.8.1-6: Void

****

Figure A.6.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

##### A.6.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

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

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.6.5.6 Active BWP switch

#### A.6.5.6.1 DCI-based and Timer-based Active BWP Switch

##### A.6.5.6.1.1 NR FR1- NR FR1 DL active BWP switch of SCell with non-DRX in SA

A.6.5.6.1.1.1 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.6.5.6.1.1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.6.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.6.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (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.

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 Cell 2 (SCell) on radio channel 2 (SCC).

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

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

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

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

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell’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 SCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on 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 SCell’s BWP-2 no later than the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

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

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

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

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

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

Table A.6.5.6.1.1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD - FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD - TDD duplex mode |
| 3 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD - FDD duplex mode |
| 4 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD - TDD duplex mode |
| 5 | NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD - TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration | |

Table A.6.5.6.1.1.1-2: 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 for 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 |
| *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.6.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | Cell2 |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1 |  | FDD | FDD |
|  | Config 2,5 |  | TDD | TDD |
|  | Config 3 |  | TDD | FDD |
|  | Config 4 |  | FDD | TDD |
| TDD configuration | Config 1 |  | Not Applicable | Not Applicable |
|  | Config 2 |  | TDDConf.1.1 | TDDConf.1.1 |
|  | Config 3 |  | TDDConf.1.1 | Not Applicable |
|  | Config 4 |  | Not Applicable | TDDConf.1.1 |
|  | Config 5 |  | TDDConf.2.1 | TDDConf.2.1 |
| BWchannel | Config 1,2,3,4 |  | Note 7 | Note 7 |
|  | Config 5 |  | Note 7 | Note 7 |
| BWoccupied | Config 1,2,3,4 | RB | 52 Note 5 | 52 Note 5 |
| Config 5 | 106 Note 6 | 106 Note 6 |
| 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 | |  | DLBWP.0.2Note4 | N.A. |
| Active DL BWP-1 Configuration | |  | N.A. | DLBWP.1.1Note4 |
| Active DL BWP-2 Configuration | |  | N.A. | DLBWP.1.3Note4 |
| Active UL BWP-0 Configuration | |  | ULBWP.0.2Note4 | N.A. |
| Active UL BWP-1 Configuration | |  | N.A. | ULBWP.1.1Note4 |
| Active UL BWP-2 Configuration | |  | N.A. | ULBWP.1.3Note4 |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | SR.1.1 FDD |
|  | Config 2 |  | SR.1.1 TDD | SR.1.1 TDD |
|  | Config 3 |  | SR.1.1 TDD | SR.1.1 FDD |
|  | Config 4 |  | SR.1.1 FDD | SR.1.1 TDD |
|  | Config 5 |  | SR.2.1 TDD | SR.2.1 TDD |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | CR.1.1 FDD |
|  | Config 2 |  | CR.1.1 TDD | CR.1.1 TDD |
|  | Config 3 |  | CR.1.1 TDD | CR.1.1 FDD |
|  | Config 4 |  | CR.1.1 FDD | CR.1.1 TDD |
|  | Config 5 |  | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.2 FDD | CCR.1.2 FDD |
|  | Config 2 |  | CCR.1.2 TDD | CCR.1.2 TDD |
|  | Config 3 |  | CCR.1.2 TDD | CCR.1.2 FDD |
|  | Config 4 |  | CCR.1.2 FDD | CCR.1.2 TDD |
|  | Config 5 |  | CCR.2.4 TDD | CCR.2.4 TDD |
| OCNG Patterns | Config 1,2,3,4 |  | OP.1 Note 5 | |
| Config 5 |  | OP.1 Note 6 | |
| SSB Configuration | Config 1,2,3,4 |  | SSB.1 FR1 | |
|  | Config 5 |  | SSB.2 FR1 | |
| SMTC Configuration | |  | SMTC.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 1,2,3,4 | dBm/SCS | -104 | -104 |
|  | Config 5 |  | -101 | -101 |
| NocNote 2 | | dBm/15KHz | -104 | -104 |
| SS-RSRP Note 3 | Config 1,2,3,4 | dBm/SCS | -87 | -87 |
|  | Config 5 |  | -84 | -84 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| IoNote3 | Config 1,2,3,4 | dBm/  9.36MHz | -58.96 | -58.96 |
|  | Config 5 | 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 within BWoccupied.  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: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | |

A.6.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on 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 SCell on 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 SCell 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 PCell interruption during SCell 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 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed SCell 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.6.5.6.1.2 NR FR1 DL active BWP switch with non-DRX in SA

A.6.5.6.1.2.1 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.6.5.6.1.2.1-1. The test scenario comprises of one cell (Cell 1) as given in Table A.6.5.6.1.2.1-2. Cell-specific parameters of the cell are specified in Table A.6.5.6.1.2.1-3 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.6.5.6.1.2.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: A UE which fulfils the requirements in test case A.6.5.6.1.1 can skip the test cases in A.6.5.6.1.2. | |

Table A.6.5.6.1.2.1-2: 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 |  |
| *bwp-InactivityTimer* | ms | 200 |  |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

Table A.6.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 1 |
| Frequency Range | | | |  | FR1 |
| Duplex mode | | | Config 1 |  | FDD |
|  | | | Config 2,3 |  | TDD |
| TDD configuration | | | Config 1 |  | Not Applicable |
|  | | | Config 2 |  | TDDConf.1.1 |
|  | | | Config 3 |  | TDDConf.2.1 |
| BWchannel | | | Config 1 |  | 10 MHz: NRB,c = 52 |
|  | | | Config 2 |  | 10 MHz: NRB,c = 52 |
|  | | | Config 3 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | | |  | 1, 2 |
| Initial DL BWP Configuration | | | Config 1,2,3 |  | DLBWP.0.2 Note 4 |
| Active DL BWP-1 Configuration | | | Config 1,2,3 |  | DLBWP.1.1 Note 4 |
| Active DL BWP-2 Configuration | | | Config 1,2,3 |  | DLBWP.1.3 Note 4 |
| Initial UL BWP Configuration | | | Config 1,2,3 |  | ULBWP.0.2 Note 4 |
| Active UL BWP-1 Configuration | | | Config 1,2,3 |  | ULBWP.1.1 Note 4 |
| Active UL BWP-2 Configuration | | | Config 1,2,3 |  | ULBWP.1.3 Note 4 |
| PDSCH Reference measurement channel | | | Config 1 |  | SR.1.1 FDD |
|  | | | Config 2 | SR.1.1 TDD |
|  | | | Config 3 | SR.2.1 TDD |
| RMSI CORESET parameters | | | Config 1 |  | CR.1.1 FDD |
|  | | | Config 2 | CR.1.1 TDD |
|  | | | Config 3 | CR.2.1 TDD |
| Dedicated CORESET parameters | | | Config 1 |  | CCR.1.2 FDD |
|  | | | Config 2 | CCR.1.2 TDD |
|  | | | Config 3 | CCR.2.4 TDD |
| OCNG Patterns | | | |  | OP.1 |
| SSB Configuration | | | Config 1,2 |  | SSB.1 FR1 |
|  | | | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | | |  |  | SMTC.1 |
| Correlation Matrix and Antenna Configuration | | | |  | 1x2 Low |
| TRS Configuration | | Config 1,4 | |  | TRS.1.1 FDD |
|  | | Config 2,5 | |  | TRS.1.1 TDD |
|  | | Config 3,6 | |  | TRS.1.2 TDD |
| 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 1,2 | | | dBm/SCS | -104 |
|  | Config 3 | | |  | -101 |
| NocNote 2 | | | | dBm/15kHz | -104 |
| SS-RSRP Note 3 | Config 1,2 | | | dBm/SCS | -87 |
|  | Config 3 | | |  | -84 |
| Ês/Iot | | | | dB | 17 |
| Ês/Noc | | | | dB | 17 |
| IoNote3 | | | Config 1,2 | dBm/  9.36MHz | -58.96 |
|  | | | Config 3 | 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]. | | | | | |

A.6.5.6.1.2.2 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.6.5.6.2 RRC-based Active BWP Switch

##### A.6.5.6.2.1 NR FR1 DL active BWP switch of Cell with non-DRX in SA

A.6.5.6.2.1.1 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.6.5.6.2.1.1-1. The test scenario comprises of one Cell (Cell 1) as given in Table A.6.5.6.2.1.1-2. Cell-specific parameters of Cell are specified in Table A.6.5.6.2.1.1-3 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.6.5.6.2.1.1-1: DL BWP switch supported test configurations in SA scenario

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz 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 | |

Table A.6.5.6.2.1.1-2: 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 |  |
| DRX |  | OFF |  |
| T1 | s | 0.2 |  |

Table A.6.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA scenario

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 1 |
| Frequency Range | | | |  | FR1 |
| Duplex mode | | Config 1 | |  | FDD |
|  | | Config 2,3 | |  | TDD |
| TDD configuration | | Config 1 | |  | Not Applicable |
|  | | Config 2 | |  | TDDConf.1.1 |
|  | | Config 3 | |  | TDDConf.2.1 |
| BWchannel | | Config 1 | |  | 10 MHz: NRB,c = 52 |
|  | | Config 2 | |  | 10 MHz: NRB,c = 52 |
|  | | Config 3 | |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | | |  | 1 |
| Initial DL BWP Configuration | | Config 1,2, 3 | |  | DLBWP.0.2 |
| Initial UL BWP Configuration | | Config 1,2, 3 | |  | ULBWP.0.2 |
| Initial Condition | Active DL BWP-1 Configuration | Config 1, 2, 3 | |  | DLBWP.1.3 |
|  | Active UL BWP-1 Configuration | Config 1, 2, 3 | |  | ULBWP.1.3 |
| Final  Condition | Active DL BWP-1 Configuration | Config 1, 2, 3 | |  | DLBWP.1.1 |
|  | Active UL BWP-1 Configuration | Config 1, 2, 3 | |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | Config 1 | |  | SR.1.1 FDD |
|  | | Config 2 | |  | SR.1.1 TDD |
|  | | Config 3 | |  | SR2.1 TDD |
| RMSI CORESET parameters | | Config 1 | |  | CR.1.1 FDD |
|  | | Config 2 | |  | CR.1.1 TDD |
|  | | Config 3 | |  | CR2.1 TDD |
| Dedicated CORESET parameters | | Config 1 | |  | CCR.1.2 FDD |
|  | | Config 2 | |  | CCR.1.2 TDD |
|  | | Config 3 | |  | CCR.2.4 TDD |
| OCNG Patterns | | | |  | OP.1 |
| SSB Configuration | | Config 1,2 | |  | SSB.1 FR1 |
|  | | Config 3 | | SSB.2 FR1 |
| SMTC Configuration | | | |  | SMTC.1 |
| TRS Configuration | | | Config 1 |  | TRS.1.1 FDD |
|  | | | Config 2 |  | TRS.1.1 TDD |
|  | | | Config 3 |  | TRS.1.2 TDD |
| Antenna Configuration | | | |  | 1x2 Low |
| 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 1,2 | | dBm/SCS | -104 |
|  | | Config 3 | |  | -101 |
| SS-RSRP Note 3 | | Config 1,2 | | dBm/SCS | -87 |
|  | | Config 3 | |  | -84 |
| Ês/Iot | | | | dB | 17 |
| Ês/Noc | | | | dB | 17 |
| IoNote3 | | Config 1,2 | | dBm/  9.36MHz | -58.96 |
|  | | Config 3 | | 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.6.5.6.2.1.2 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>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.7.3.2.1.1 Intra-frequency RRC Re-establishment in FR2

A.7.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.1.1-1, table A.7.3.2.1.1.1-2 and table A.7.3.2.1.1.1-3 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, becomes inactive. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.1.1-1: Supported test configurations

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

Table A.7.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1 | Cell1 |  |
|  | Neighbour cells |  | 1 | Cell2 |  |
| Final condition | Active cell |  | 1 | Cell2 |  |
| RF Channel Number | |  | 1 | 1 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| N310 | | - | 1 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1 | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 1 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1 | OFF |  |
| PRACH configuration | |  | 1 | FR2 PRACH configuration 1 | Table A.3.8.3.1-1 |
| T1 | | s | 1 | 5 |  |
| T2 | | s | 1 | 4.84 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1 | 5 |  |

Table A.7.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| 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 | | |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1 | -0.12 | -infinity | -infinity | -3.46 | 2 | 2 |
| Note2 | dBm/15 kHz | 1 | -104.7 | | | | | |
| Note2 | dBm/SCS | 1 | -95.7 | | | | | |
|  | dB | 1 | 4 | -infinity | -infinity | 2 | 2 | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -91.7 | -infinity | -infinity | -93.7 | -93.7 | -93.7 |
| Io | dBm/95.04 MHz | 1 | -59.64 | -62.59 | -62.59 | -59.94 | -62.59 | -62.59 |
| 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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

A.7.3.2.1.1.2 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 an unknown NR intra frequency cell shall be less than 5 s.

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:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

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 = 1

Tidentify\_intra\_NR = 3520 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 intra-frequency NR cell.

TPRACH = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.7.3.2.1.2 Inter-frequency RRC Re-establishment in FR2

A.7.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.2.1-1, table A.7.3.2.1.2.1-2 and table A.7.3.2.1.2.1-3 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.7.3.2.1.2.1-1: Supported test configurations

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

Table A.7.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Value** | **Comment** |
| Initial condition | Active cell |  | 1 | Cell1 |  |
|  | Neighbour cells |  | 1 | Cell2 |  |
| Final condition | Active cell |  | 1 | Cell2 |  |
| RF Channel Number | |  | 1 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| N310 | | - | 1 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1 | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 1 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1 | OFF |  |
| PRACH configuration | |  | 1 | FR2 PRACH configuration 1 | Table A.3.8.3.1-1 |
| T1 | | s | 1 | 5 |  |
| T2 | | s | 1 | 4.84 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1 | 6 |  |

Table A.7.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| AoA setup |  | 1 | Setup 3 as specified in clause A.3.15 | | | | | |
|  |  |  | AoA1 | | | AoA2 | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1 | 24 | | | 24 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| 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 | | |
| Note2 | dBm/15 kHz | 1 | -92.1 | | | -92.1 | | |
| Note2 | dBm/SCS | 1 | -83.1 | | | -83.1 | | |
|  | dB | 1 | 0 | -infinity | -infinity | -infinity | -infinity | 0 |
| BB Note 5 | dB | 1 | -1.01 | -infinity | -infinity | -infinity | -infinity | -1.01 |
| SSB\_RP Note3 | dBm/SCS | 1 | -83.1 | -infinity | -infinity | -infinity | -infinity | -83.1 |
| Io | dBm/95.04 MHz | 1 | -55.46 | -infinity | -infinity | -infinity | -infinity | -55.46 |
| Propagation Condition |  | 1 | AWGN | | | AWGN | | |
| Note 1: OCNG shall be used such that a constant total transmitted power 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: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

A.7.3.2.1.2.2 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 than 6 s.

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:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

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 = 1600 ms

Tidentify\_inter\_NR = 2080 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 = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 5025 ms, allow 6 s in the test case.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.7.3.2.1.3 Intra-frequency RRC Re-establishment in FR2 without serving cell timing

###### A.7.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.3.1-1, table A.7.3.2.1.3.1-2 and table A.7.3.2.1.3.1-3 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, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.3.1-1: Supported test configurations

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

Table A.7.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1 | Cell1 |  |
|  | Neighbour cells |  | 1 | Cell2 |  |
| Final condition | Active cell |  | 1 | Cell2 |  |
| RF Channel Number | |  | 1 | 1 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| N310 | | - | 1 | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 1 | 6000 | Radio link failure timer configured by *RLF-TimersAndConstants* |
| T311 | | ms | 1 | 5000 | RRC re-establishment timer |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | SSB.1 FR2 |  |
| SMTC configuration | |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1 | OFF |  |
| PRACH configuration | |  | 1 | FR2 PRACH configuration 1 | Table A.3.8.3.1-1 |
| T1 | | s | 1 | 5 |  |
| T2 | | s | 1 | 10.84 | Time for the UE to detect RLF  (Summation of TEvaluate\_out\_SSB defined in clause 8.1 in TS 38.133, T310 and the period for UE turns off transmitter defined in clause 8.1.5 in TS 38.133 ) |
| T3 | | s | 1 | 5 |  |

Table A.7.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Assumption for UE beamsNote 4 |  |  | Rough | | | Rough | | |
| TDD configuration |  | 1 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | N/A | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 FDD | | | CR.3.1 FDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 FDD | | | CCR.3.1 FDD | | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | | N/A | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | N/A | | |
| 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 | | |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| Note2 | dBm/15 kHz | 1 | -104.7 | | | | | |
| Note2 | dBm/SCS | 1 | -95.7 | | | | | |
|  | dB | 1 | 5 | -infinity | -infinity | -infinity | -infinity | 5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -90.7 | -infinity | -infinity | -infinity | -infinity | -90.7 |
| Io | dBm/95.04 MHz | 1 | -60.52 | -66.71 | -60.52 | -60.52 | -66.71 | -60.52 |
| 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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

###### A.7.3.2.1.3.2 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 5 s.

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:

Tre-establish\_delay= TUL\_grant + TUE\_re-establish\_delay.

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 = 1

Tidentify\_intra\_NR = 3520 ms

TSI = 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 = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.7.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

*Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.*

#### A.7.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.7.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.7.5.1.1.1-1. The test parameters are given in Tables A.7.5.1.1.1-2, A.7.5.1.1.1-3, and A.7.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In addition to RLM-RS radio link monitoring using SSB index 0 and SSB index 1, the UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.7.5.1.1.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

Table A.7.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 24 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP. 5 |
| CP length | | |  | Normal |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | *gp0* |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 9.68 |
| T3 | | | s | 9.68 |
| D1 | | | s | 9.64 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.7.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | |
|  | |  | AoA1 | | | AoA2 | | |
| Assumption for UE beams Note 5 | |  | Rough | | | Rough | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | | Not sent | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |  | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |  | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 |  | | |
| ssb-Index 1 SNR | Config 1 |  | Not sent | | | 2Note 6 | -15 | -15 |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.7.5.1.1.1-2 | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | TDL-A 30ns 75Hz | | |
| Note 1: OCNG shall be used such a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | |

Table A.7.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
| Value |
| gapOffset | 0 |

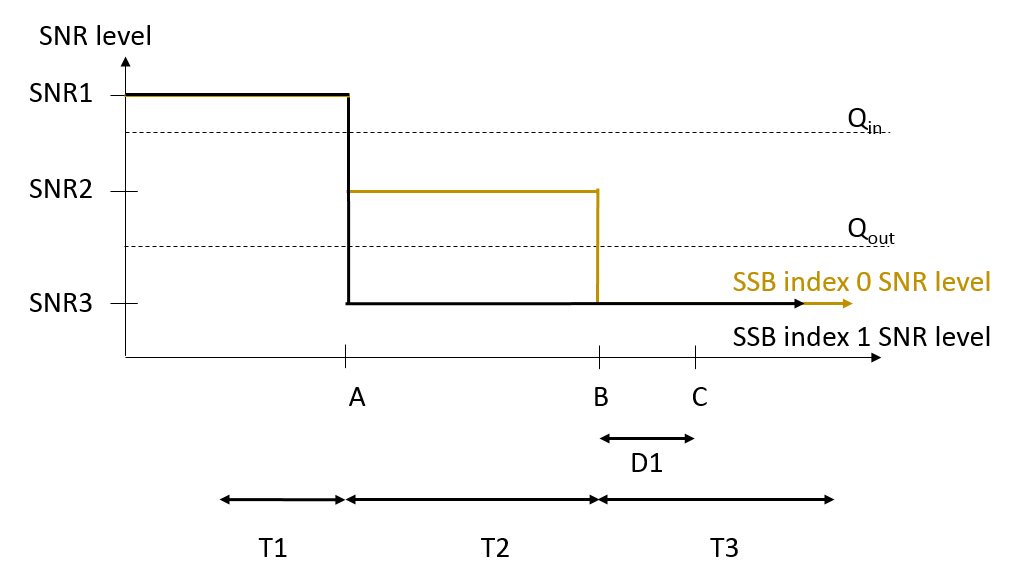


Figure A.7.5.1.1.1-1: SNR variation for out-of-sync testing



Figure A.7.5.1.1.1-2: Time multiplexed downlink transmissions

##### A.7.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

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

#### A.7.5.1.2 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

##### A.7.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.7.5.1.2.1-1.The test parameters are given in Tables A.7.5.1.2.1-2, and A.7.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.7.5.1.2.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

Table A.7.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 24 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP. 5 |
| CP length | | |  | Normal |
| In sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX | | |  | *OFF* |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | 4000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 1.88 |
| T4 | | | s | 0.2 |
| T5 | | | s | 3.84 |
| D1 | | | s | 3.8 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.7.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
|  | |  | **AoA1** | | | | | **AoA2** | | | | |
| Assumption for UE beams Note 5 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | | Not sent | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |  | | | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |  | | | | |
| ssb-Index 1 SNR | Config 1 |  | Not sent | | | | | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | | | -92.1 | | | | |
| Time multiplexing of the downlink transmissions from each AoA | |  | Defined in Figure A.7.5.1.2.1-2 | | | | | | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | | | | | |

Table A.7.5.1.2.1-4: Void

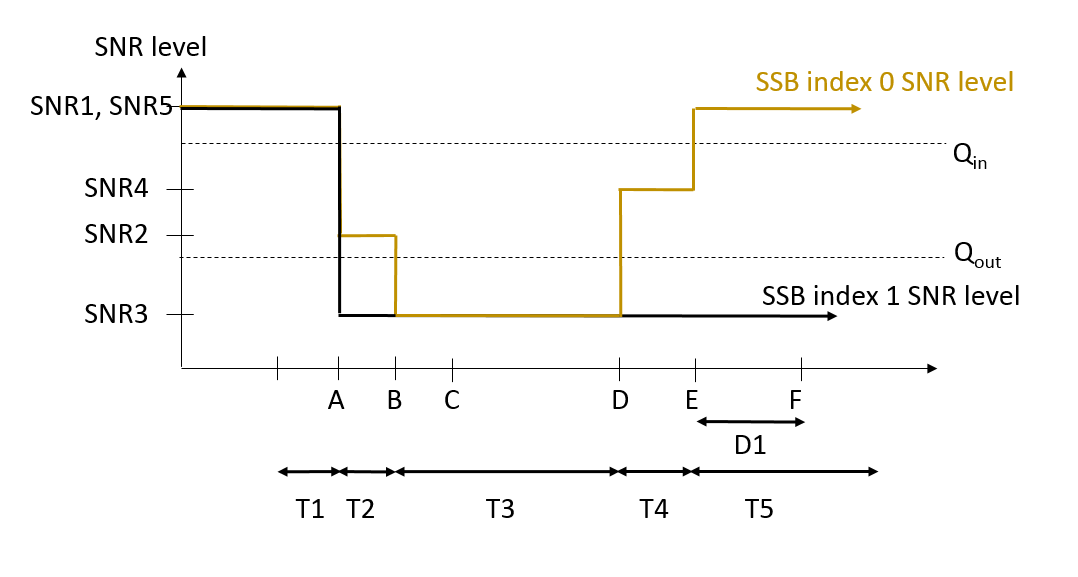


Figure A.7.5.1.2.1-1: SNR variation for in-sync testing



Figure A.7.5.1.2.1-2: Time multiplexed downlink transmissions

##### A.7.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.7.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

##### A.7.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.7.5.1.3.1-1. The test parameters are given in Tables A.7.5.1.3.1-2, and A.7.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.7.5.1.3.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

Table A.7.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 66 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.4 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX Configuration | | |  | DRX.3 |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | *0* |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 14.48 |
| T3 | | | s | 14.48 |
| D1 | | | s | 14.44 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.7.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | |
| Assumption for UE beams Note 5 | |  | Rough | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | |
| EPRE ratio of PSS to SSS | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 |
| ssb-Index 1 SNR | Config 1 | 2Note 6 | -15 | -15 |
|  | Config 1 | dBm/15KHz | -104.7dBm | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | |
| 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: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | |

Table A.7.5.1.3.1-4: Void

Table A.7.5.1.3.1-5: Void

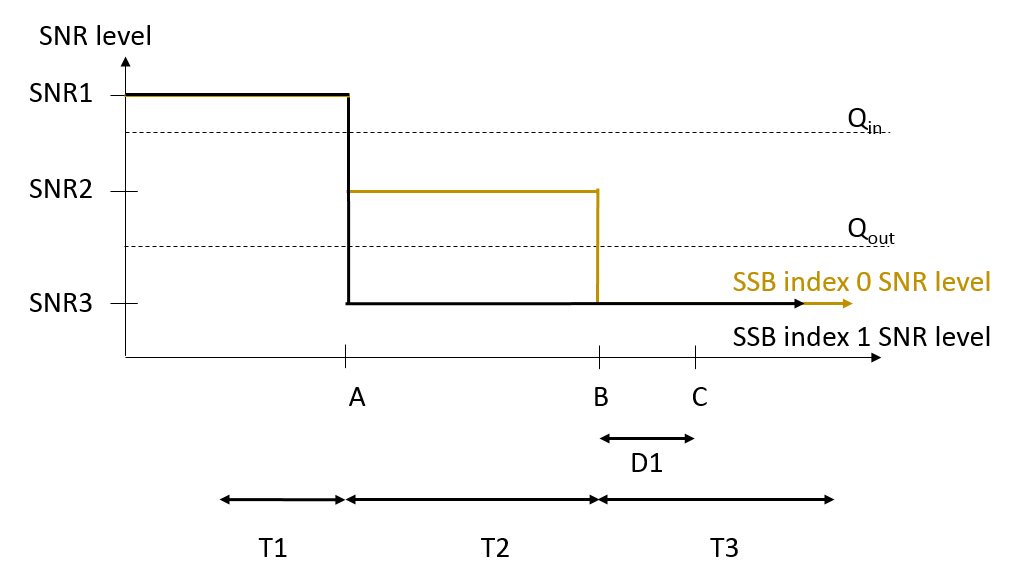


Figure A.7.5.1.3.1-1: SNR variation for out-of-sync testing

##### A.7.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

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

#### A.7.5.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

##### A.7.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to ‘*rlf*’. Supported test configurations are shown in table A.7.5.1.4.1-1. The test parameters are given in Tables A.7.5.1.4.1-2, and A.7.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.7.5.1.4.1-1: Supported test configurations for FR2 PCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz |

Table A.7.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
|  | | |  | Test 1 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 |  | 100: NRB,c = 66 |
| Data RBs allocated | | Config 1 |  | 66 |
| DL initial BWP configuration | | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | | Config 1 |  | ULBWP.1.1 |
| TDD Configuration | | Config 1 |  | TDDConf.3.1 |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.3.1 TDD |
| SSB Configuration | | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | | Config 1 |  | SMTC.3 |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 120 KHz |
| PRACH Configuration | | Config 1 |  | Table A.3.8.3.4 |
| SSB index assigned as RLM RS | | Config 1 |  | 0,1 |
| OCNG parameters | | |  | OP.1 |
| CP length | | |  | Normal |
| In sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 0 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| Out of sync transmission parameters | DCI format | |  | 1-0 |
|  | Number of Control OFDM symbols | |  | 2 |
|  | Aggregation level | | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average SSS RE energy | | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | dB | 4 |
|  | DMRS precoder granularity | |  | REG bundle size |
|  | REG bundle size | |  | 6 |
| DRX Configuration | | |  | DRX.11 |
| Gap pattern ID | | |  | N.A. |
| Layer 3 filtering | | |  | *Enabled* |
| T310 timer | | | ms | 4000 |
| T311 timer | | | ms | 1000 |
| N310 | | |  | 1 |
| N311 | | |  | 1 |
| CSI-RS for CSI reporting | | Config 1 |  | CSI-RS.3.1 TDD |
| TCI states for PDCCH/PDSCH | | |  | TCI.State.2 |
| CSI-RS for tracking | | Config 1 |  | TRS.2.1 TDD |
| T1 | | | s | 0.2 |
| T2 | | | s | 0.2 |
| T3 | | | s | 2.8 |
| T4 | | | s | 0.2 |
| T5 | | | s | 3.88 |
| D1 | | | s | 3.84 |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

Table A.7.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring test in DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 5 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| ssb-Index 0 SNR | Config 1 | dB | 2Note 6 | -6Note 6 | -15 | -4.5 | 2Note 6 |
| ssb-Index 1 SNR | Config 1 | 2Note 6 | -15 | -15 | -15 | -15 |
|  | Config 1 | dBm/15KHz | -104.7dBm | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| 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: The signal contains PDCCH for UEs other than the device under test as part of OCNG.3  Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | | | |

Table A.7.5.1.4.1-4: Void

Table A.7.5.1.4.1-5: Void

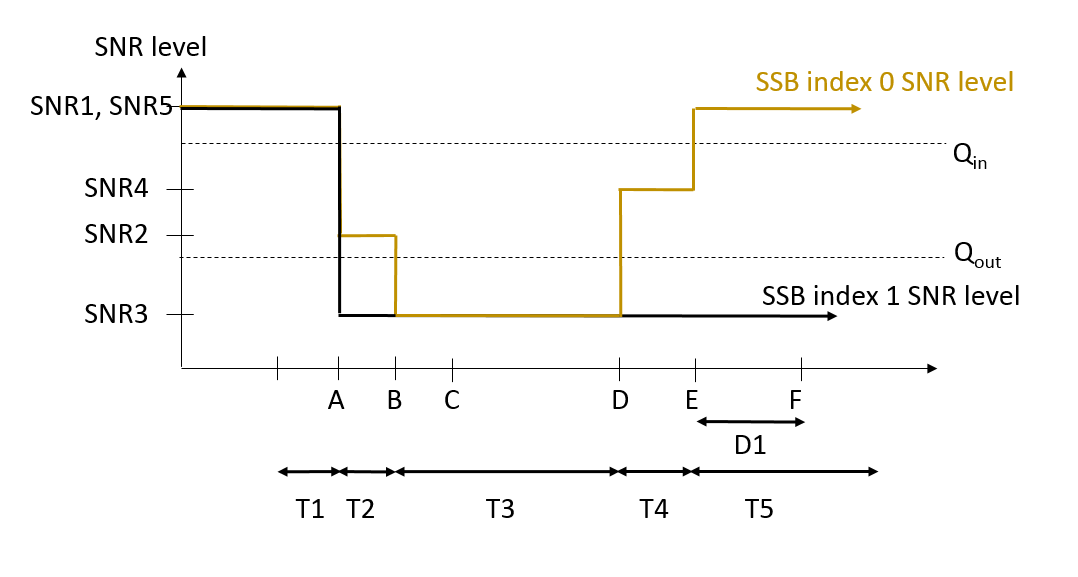


Figure A.7.5.1.4.1-1: SNR variation for in-sync testing

##### A.7.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

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

#### A.7.5.1.5 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

##### A.7.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.5.1-1, A.7.5.1.5.1-2, A.7.5.1.5.1-3 and A.7.5.1.5.1-4 below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.5.1-1: Supported test configurations for FR2 PCell

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

Table A.7.5.1.5.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.4 TDD  CCR.3.6 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.2 |
| CP length | |  | Normal |
| Out of sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | OFF |
| Gap pattern ID | |  | \**gp0* |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *0* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.35 |
| T3 | | s | 0.35 |
| D1 | | s | 0.31 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.7.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | |
|  | |  | **AoA1** | | | **AoA2** | | |
| Assumption for UE beams Note 10 | |  | Rough | | | Rough | | |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | | Not sent | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | |  | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB | 0 | | |  | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | |  | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB |  | | |  | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |  | | |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 |  | | |
| SNR on RLM-RS2 | Config 1 |  | Not sent | | | 2Note 11 | -14 | -15 |
|  | Config 1 | dBm/ 15kHz | -92.1 | | | -92.1 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | TDL-C 300ns 100Hz | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.5.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | | |

Table A.7.5.1.5.1-4: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
| Value |
| gapOffset | 0 |
| Note 1: RLM RS is partially overlapped with measurement gap | |

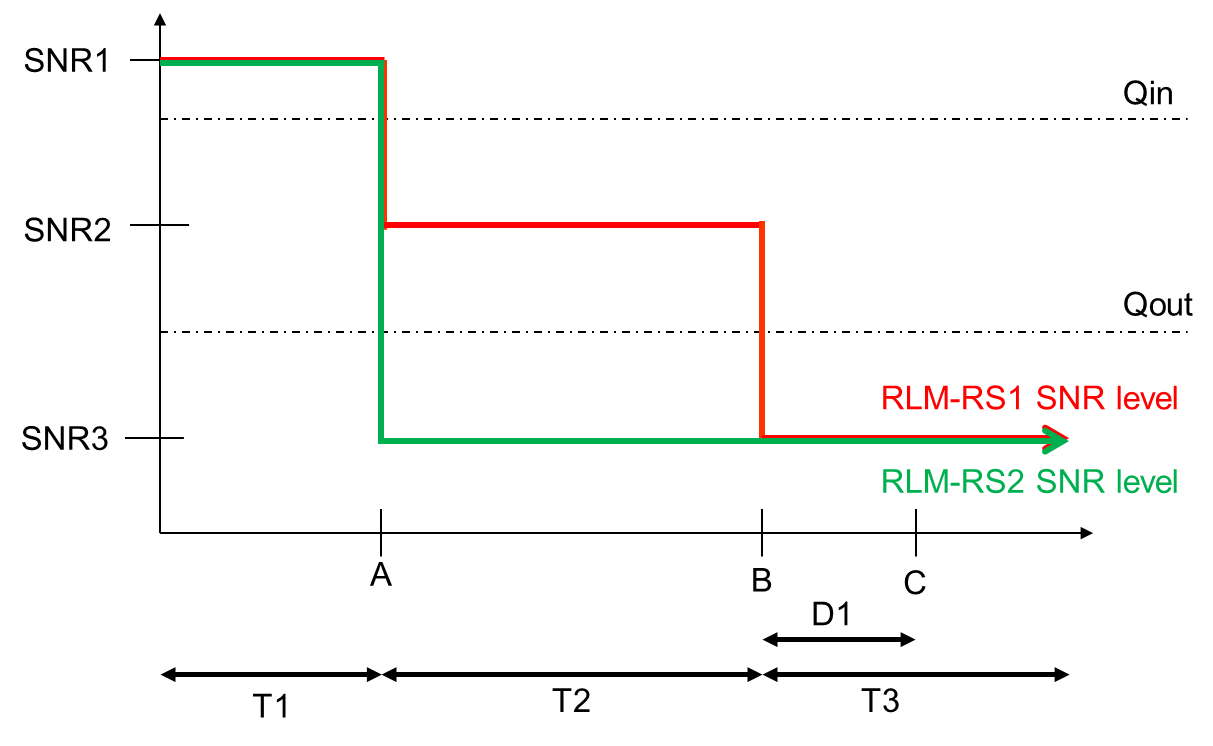
****

Figure A.7.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.7.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D1 second after the start of the time duration T3) on the PCell.

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

#### A.7.5.1.6 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

##### A.7.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.6.1-1, A.7.5.1.6.1-2 and A.7.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.6.1-1: Supported test configurations for FR2 PCell

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

Table A.7.5.1.6.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.2 |
| CP length | |  | Normal |
| Out of sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| In sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | OFF |
| Gap pattern ID | |  | N.A. |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | 1000 |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.2 |
| T3 | | s | 0.24 |
| T4 | | s | 0.2 |
| T5 | | s | 0.88 |
| D1 | | s | 0.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.7.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | | | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 3 defined in A.3.15 | | | | | | | | | |
|  | |  | **AoA1** | | | | | **AoA2** | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | | | | Not sent | | | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | | | |  | | | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB | 0 | | | | |  | | | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | | | |  | | | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB |  | | | | |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | | | |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |  | | | | |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |  | | | | |
| SNR on RLM-RS2 | Config 1 |  | Not sent | | | | | 2Note 11 | -14 | -15 | -15 | -14 |
|  | Config 1 | dBm/ 15KHz | -92.1 | | | | | -92.1 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | | TDL-C 300ns 100Hz | | | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.6.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | | | | | | | | |

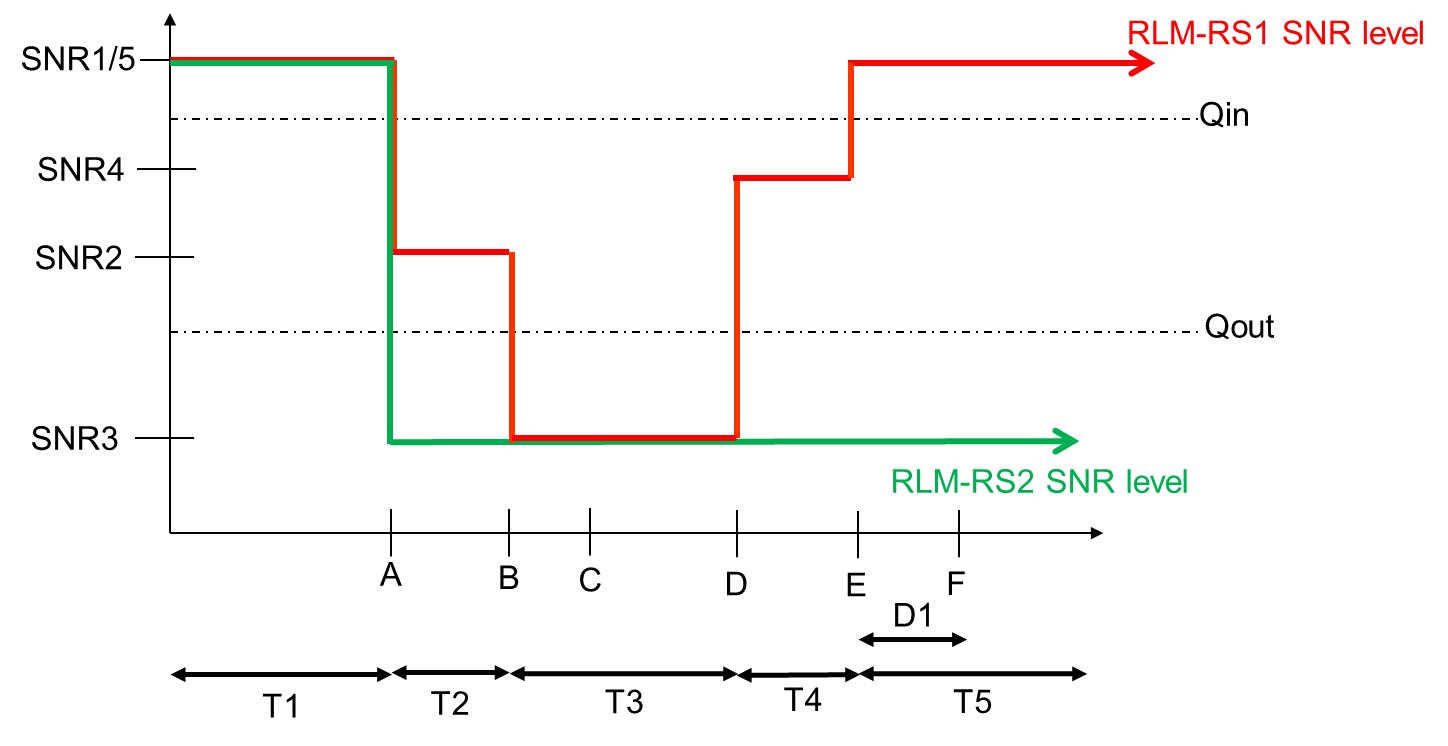
****

Figure A.7.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

##### A.7.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

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

#### A.7.5.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

##### A.7.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.7.1-1, A.7.5.1.7.1-2, and A.7.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.7.1-1: Supported test configurations for FR2 PCell

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

Table A.7.5.1.7.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.4 TDD  CCR.3.6 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Out of sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | DRX.3 |
| Gap pattern ID | |  | N.A. |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *0* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 1.28 |
| T3 | | s | 1.28 |
| D1 | | s | 1.24 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

**Table A.7.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | |
|  | |  | T1 | T2 | T3 |
| AoA setup | | dB | Setup 1 defined in A.3.15 | | |
| Assumption for UE beams Note 10 | |  | Rough | | |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB | 0 | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB |  | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 |
| SNR on RLM-RS2 | Config 1 | dB | 2Note 11 | -14 | -15 |
|  | Config 1 | dBm/15KHz | -104.7 | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.7.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | |

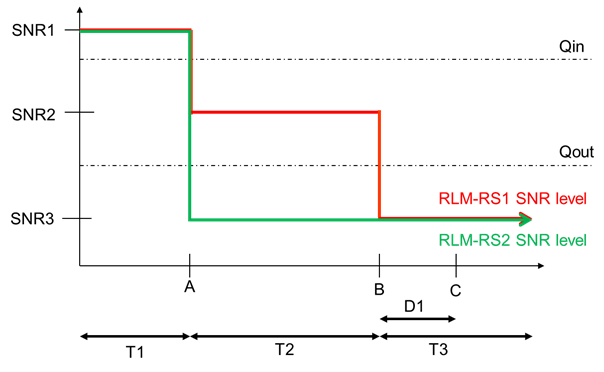
****

Figure A.7.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

##### A.7.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D1 secondafter the start of the time duration T3) on the PCell.

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

#### A.7.5.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

##### A.7.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.8.1-1, A.7.5.1.8.1-2, A.7.5.1.8.1-3 and A.7.5.1.8.1-4 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.8.1-1: Supported test configurations for FR2 PSCell

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

Table A.7.5.1.8.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
|  | |  | Test 1 |
| Active PCell | |  | Cell 1 |
| RF Channel Number | |  | 1 |
| Duplex mode | Config 1 |  | TDD |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.3.1 TDD  CCR.3.3 TDD |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |
| SMTC Configuration | Config 1 |  | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |
| CSI-RS for RLM | Config 1 |  | Resource #4 in TRS.2.1 TDD  Resource #4 in TRS.2.2 TDD |
| TRS configuration | |  | TRS.2.1 TDD  TRS.2.2 TDD |
| TCI configuration for PDCCH#1/PDSCH | |  | TCI.State.2 |
| TCI configuration for PDCCH#2 | |  | TCI.State.3 |
| OCNG parameters | |  | OP.1 |
| CP length | |  | Normal |
| Out of sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 8 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 4 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 4 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| In sync transmission parameters | DCI format |  | 1-0 |
|  | Number of Control OFDM symbols |  | 2 |
|  | Aggregation level | CCE | 4 |
|  | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |
|  | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |
|  | DMRS precoder granularity |  | REG bundle size |
|  | REG bundle size |  | 6 |
| DRX | |  | DRX.3 |
| Gap pattern ID | |  | \*[*gp0*] |
| Layer 3 filtering | |  | *Enabled* |
| T310 timer | | ms | *2000* |
| T311 timer | | ms | 1000 |
| N310 | |  | 1 |
| N311 | |  | 1 |
| CSI-RS for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD |
| T1 | | s | 0.2 |
| T2 | | s | 0.2 |
| T3 | | s | 1.64 |
| T4 | | s | 0.2 |
| T5 | | s | 1.88 |
| D1 | | s | 1.84 |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | |

Table A.7.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | | dB | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSSPDCCH\_beta | | dB | 4 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRSPDCCH\_DMRS\_beta | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSSPBCH\_beta | | dB | 0 | | | | |
| EPRE ratio of PBCH to PBCH DMRSPSS\_beta | | dB |  | | | | |
| EPRE ratio of PSS to SSSSSS\_beta | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS PDSCH\_beta | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR on RLM-RS1 | Config 1 | dB | 2Note 11 | -6Note 11 | -15 | -4.5 | 2Note 11 |
| SNR on RLM-RS2 | Config 1 | dB | 2Note 11 | -14 | -15 | -15 | -14 |
|  | Config 1 | dBm/15KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-C 300ns 100Hz | | | | |
| 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: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband. | | | | | | | |

Table A.7.5.1.8.1-4: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

|  |  |
| --- | --- |
| Field | Test 1 |
| Value |
| gapOffset | 0 |
| Note 1: RLM RS is partially overlapped with measurement gap | |

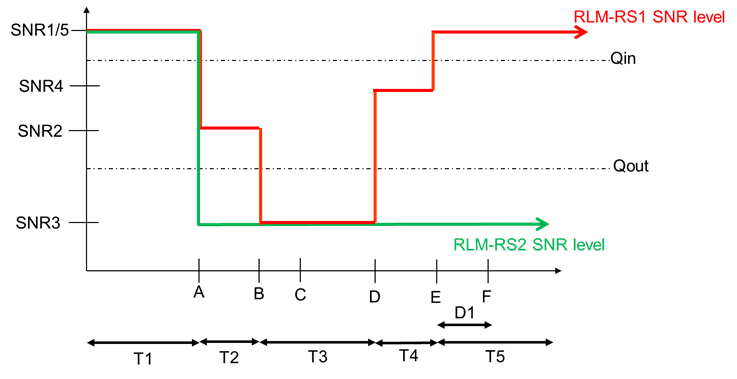
****

Figure A.7.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

##### A.7.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

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

#### A.7.5.1.9 UE Radio Link Monitoring Scheduling Restrictions on FR2

##### A.7.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

The test parameters are given in table A.7.5.1.9.1-1, table A.7.5.1.9.1-2 and table A.7.5.1.9.1-3 below. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.7.5.1.9.1-1: Supported test configurations

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

Table A.7.5.1.9.1-2: General test parameters for NR RLM scheduling restriction test case in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| RF Channel Number |  | 1 | 1 |  |
| SSB configuration |  | 1 | SSB.1 FR2 |  |
| SMTC configuration |  | 1 | SMTC pattern 1 |  |
| DRX cycle length | s | 1 | OFF |  |
| T1 | s | 1 | 5 | During T1 the UE is required to correctly transmit ACK/NACK |

Table A.7.5.1.9.1-3: Cell specific test parameters for NR RLM scheduling restriction test case in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | |
| AoA setup |  | 1 | Setup 3 defined in A.3.15.3 | |
|  |  |  | AoA1 | AoA2 |
| Assumption for UE beams Note 1 |  |  | Rough | Rough |
| TDD configuration |  | 1 | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | |
| PDSCH Reference measurement channel |  | 1 | SR.3.2 TDD | Not sent |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | Not sent |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.2 TDD | Not sent |
| TRS configuration |  | 1 | TRS.2.1 TDD | TRS.2.2 TDD |
| PDCCH/PDSCH TCI state |  | 1 | TCI.State.2 | N/A |
| OCNG Pattern |  | 1 | OP.5 defined in A.3.2.1 | Not sent |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | |
| RLM-RS |  | 1 | SSB with index 0 | SSB with index 1 |
|  | dBm/15kHz | 1 | -92.1 | -92.1 |
| Note2 | dBm/SCS | 1 | -83.1 | -83.1 |
|  | dB | 1 | 2 | 2 |
| BB Note 4 | dB | 1 | 1 | 1 |
| SSB\_RP Note3 | dBm/SCS | 1 | -81.1 | -81.1 |
| Io | dBm/95.04 MHz | 1 | -54.35 | -54.35 |
| Time multiplexing of the downlink transmissions from each AoA | | 1 | Defined in Figure A.7.5.1.9.1-1 | |
| Propagation Condition |  | 1 | AWGN | AWGN |
| Note 1: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  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: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | |



Figure A.7.5.1.9.1-1: Time multiplexed downlink transmissions

##### A.7.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.8.3.1.1.2 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 = 50 ms and is specified in TS36.133.

Tinterrupt = 62 ms in the test; Tinterrupt is defined in TS36.133 clause 5.3.4.3.

This gives a total of 112 ms.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.8.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.1.1-1, A.8.4.2.1.1-2, A.8.4.2.1.1-3 and A.8.4.2.1.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.1.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.1.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

Table A.8.4.2.1.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | 19 | As specified in TS 36.331 [16]. |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | | E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | dBm | 1, 2, 3, 4, 5, 6 | Note 2 | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | 2, 3, 5, 6 | 3μs | | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 1 | 1 |  |
| Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.1.1-3  Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.1.1-4 | | | | | |

Table A.8.4.2.1.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
| 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: 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 4: 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 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

Table A.8.4.2.1.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
|  |  | 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
|  |  | 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 4 | SMTC.2 | |
|  |  | 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
|  |  | 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
|  |  | 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 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 | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| 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.  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. | | | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.8.4.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.2.1-1, A.8.4.2.2.1-2, A.8.4.2.2.1-3 and A.8.4.2.2.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.2.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.2.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.2.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

Table A.8.4.2.2.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | | | Comment |
|  |  |  | Test 1 | Test 2 | | Test 3 | Test 4 | |  |
| E-UTRA RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | | | | | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | | | | | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | | | | | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | | | | | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | | | 4 | | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | | | 19 | | | As specified in TS 36.331 [16]. |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | | | | | | E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | dBm | 1, 2, 3, 4, 5, 6 | Note 2 | | | | | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | | | | | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | | | | | |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 | | | | | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | | | | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | DRX.9 | DRX.12 | | DRX.9 | DRX.12 | | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | | | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | 2, 3, 5, 6 | 3μs | | | | | | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | | | | | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 2 | | 11 | 2 | | 11 |  |
| Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.2.1-3  Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.2.1-4 | | | | | | | | | |

Table A.8.4.2.2.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
| 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: 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 4: 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 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

Table A.8.4.2.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
|  |  | 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
|  |  | 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 4 | SMTC.2 | |
|  |  | 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
|  |  | 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
|  |  | 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 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 | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
|  |  | 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
|  |  | 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
|  | dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| 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.  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. | | | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.8.4.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.3.1-1, A.8.4.2.3.1-2, A.8.4.2.3.1-3 and A.8.4.2.3.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.3.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.3.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

Table A.8.4.2.3.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | 19 | As specified in TS 36.331 [16]. |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | | E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | dBm | 1, 2, 3, 4, 5, 6 | Note 2 | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3 ms later than the timing of Cell 1. |
|  |  | 2, 3, 5, 6 | 3μs | | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 2 | 1 |  |
| Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.3.1-3  Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.3.1-4 | | | | | |

Table A.8.4.2.3.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
| 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: 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 4: 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 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

Table A.8.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
|  |  | 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
|  |  | 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 4 | SMTC.2 | |
|  |  | 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
|  |  | 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
|  |  | 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 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 | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
|  |  | 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
|  |  | 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
|  | dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| 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.  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. | | | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

##### A.8.4.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.4.1-1, A.8.4.2.4.1-2, A.8.4.2.4.1-3 and A.8.4.2.4.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.4.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

Table A.8.4.2.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | | | Comment |
|  |  |  | Test 1 | Test 2 | | Test 3 | Test 4 | |  |
| E-UTRA RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | | | | | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | | | | | | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | | | | | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | | | | | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2, 3, 4, 5, 6 | 0 | | | 4 | | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset |  | 1, 2, 3, 4, 5, 6 | 39 | | | 19 | | | As specified in TS 36.331 [16]. |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | | | | | | E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | dBm | 1, 2, 3, 4, 5, 6 | Note 2 | | | | | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 | | | | | |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal | | | | | |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 | | | | | |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | | | | | | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | DRX.9 | DRX.12 | | DRX.9 | DRX.12 | | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | | | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | 2, 3, 5, 6 | 3μs | | | | | | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 | | | | | |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 2 | | 13 | 2 | | 13 |  |
| Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.4.1-3  Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.4.1-4 | | | | | | | | | |

Table A.8.4.2.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Configuration** | **Cell 1** | |
|  |  |  | **T1** | **T2** |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 2, 3 | FDD | |
|  |  | 4, 5, 6 | TDD | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: 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 4: 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 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | |

Table A.8.4.2.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
|  |  | 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
|  |  | 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 4 | SMTC.2 | |
|  |  | 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
|  |  | 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
|  |  | 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 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 | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
|  |  | 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
|  |  | 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
|  | dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100H | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| 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.  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. | | | | |

<<End of change>>