**3GPP TSG-RAN WG4 Meeting #98bis-e *R4-2105712***

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

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **DraftCR** | **rev** | **1** | **Current version:** | **16.7.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Draft Big CR38133 - Introduction of Rel-16 NR-U RRM performance requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_unlic-Perf | | | | |  | ***Date:*** | | | 2021-04-02 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introducing RRM performance, configuration and tests cases for NR-U. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | This CR is based on the following endorsed CRs.  **From RAN4#97-e**:  R4-2017091, Measurement accuracy requirements for NR-U, Ericsson  R4-2017092, NR-U test cases structure, Ericsson  **From RAN4#98-e**:  R4-2102526, RSSI measurement bandwidth, Ericsson  R4-2103521, Draft CR: RMC for NR-U test cases, Ericsson  R4-2103522, CCA model in NR-U test cases, Ericsson  R4-2103525, DraftCR Introduction of NR-U SCell interruption and SCell (de)activation tests, Ericsson   * Section numbers corrected in change #1, change #3, and change #5 * Table reference corrected in change #3 and change #5.   R4-2103526, DraftCR 38.133 NR-U Inter-RAT SFTD accuracy TC, Ericsson  R4-2103527, RLM test cases, Ericsson  R4-2103528, NR-U RRM, SFTD, RSSI, and CO measurements test cases, Ericsson   * Clauses A.12.4.2.1- A.12.4.2.4 in change #3 are not implemented due to overlap with R4-2104063   R4-2103533, NR-U test cases structure, Ericsson  R4-2104060, Draft CR of test cases for HO delay and interruption for NR-U, Huawei/HiSilicon  R4-2104061, Draft CR of test cases for RRC release with redirection for NR-U, Huawei/HiSilicon  R4-2104062, Draft CR of test cases for PSCell addition and release for NR-U, Huawei/HiSilicon  R4-2104063, Draft CR of test cases for inter-RAT measurement for NR-U, Huawei/HiSilicon  R4-2104077, Draft CR of test cases for intra-frequency measurement accuracy for NR-U, Huawei/HiSilicon   * Section numbers corrected in change #1 and change #3   R4-2104078, Introduction of NR-U cell reselection tests, Ericsson   * Reference corrected in change #2   R4-2104079, UE timing tests for NR-U, Ericsson  R4-2104080, Test cases on BWP switching with consistent UL LBT failures, Ericsson  R4-2104081, Draft CR: test cases for beam management in NR-U, Ericsson  ===  Change #1:   * R4-2017091, Measurement accuracy requirements for NR-U, Ericsson * R4-2102526, RSSI measurement bandwidth, Ericsson * R4-2106975, Draft CR on inter-RAT NR measurement accuracy requirements, Huawei/HiSilicon, RAN4#98bis-e * R4-2106847, NR-U accuracy requirements, Ericsson, RAN4#98bis-e   Change #2:   * R4-2017092, NR-U test cases structure, Ericsson * R4-2103521, Draft CR: RMC for NR-U test cases, Ericsson * R4-2103522, CCA model in NR-U test cases, Ericsson * R4-2103525, DraftCR Introduction of NR-U SCell interruption and SCell (de)activation tests, Ericsson * R4-2103526, DraftCR 38.133 NR-U Inter-RAT SFTD accuracy TC, Ericsson * R4-2103527, RLM test cases, Ericsson * R4-2103528, NR-U RRM, SFTD, RSSI, and CO measurements test cases, Ericsson * R4-2103533, NR-U test cases structure, Ericsson * R4-2104060, Draft CR of test cases for HO delay and interruption for NR-U, Huawei/HiSilicon * R4-2104061, Draft CR of test cases for RRC release with redirection for NR-U, Huawei/HiSilicon * R4-2104062, Draft CR of test cases for PSCell addition and release for NR-U, Huawei/HiSilicon * R4-2104063, Draft CR of test cases for inter-RAT measurement for NR-U, Huawei/HiSilicon * R4-2104077, Draft CR of test cases for intra-frequency measurement accuracy for NR-U, Huawei/HiSilicon * R4-2104078, Introduction of NR-U cell reselection tests, Ericsson * R4-2104079, UE timing tests for NR-U, Ericsson * R4-2104080, Test cases on BWP switching with consistent UL LBT failures, Ericsson * R4-2104081, Draft CR: test cases for beam management in NR-U, Ericsson * R4-2105715, Introduction of NR-U cell reselection tests, Ericsson, RAN4#98bis-e   + Modified the numbering: A.11.1.5 🡪 A.11.1.2, A.11.1.6 🡪A.11.1.3 and A.11.1. 7 🡪A.11.1.4 * R4-2105716, Draft TC NR-U handover test cases, Nokia, Nokia Shanghai Bell, RAN4#98bis-e   + Modified the numbering: A.11.2.1.6 🡪 A.11.2.1.4, A.11.2.1.7 🡪 A.11.2.1.5 * R4-2105717, Introduction of NR-U handover tests   + Modified the numbering: A.11.2.1.4 🡪 A.11.2.1.6, A.11.2.1.5 🡪 A.11.2.1.7, A.2.1.6🡪A.11.2.1.8 * R4-2106577, Draft TC RRC re-establishment with CCA, Nokia, RAN4#98bis-e * R4-2105720, RRC connection release with re-direction from NR to NR-U test in 38.133, Ericsson, RAN4#98bis-e * R4-2105721, Draft CR: Random access procedure test cases for NR-U, Ericsson, Nokia, Nokia Shanghai Bell, RAN4#98bis-e   + Changed the title of A.11.2.2.2.1 from "Contention-based random access for NR PSCell" to “4-step RA type contention-based random access for NR PCell with CCA” as agreed R4-2105721   + Changed the title of A.11.2.2.2.2 from "Non-contention based random access for NR PSCell " to “4-step RA type non-contention-based random access for NR PCell with CCA” as agreed in R4-2105721   + Changed the title of A.10.1.1.1.1 from "Contention-based random access for NR PSCell" to "4-step RA type contention-based random access for NR PSCell with CCA" as agreed in R4-2105721.   + Changed the title of A.10.1.1.1.2 from "Non-contention based random access for NR PSCell" to "4-step RA type non-contention based random access for NR PSCell with CCA" as agreed in R4-2105721. * R4-2105722, Test cases on BWP switching for NR-U SA in TS 38.133, Ericsson, RAN4#98bis-e * R4-2105724, Draft CR: Update of beam management test cases for NR-U, Ericsson, RAN4#98bis-e * R4-2106578, Draft TC NR-U inter-frequency measurements, Nokia/ Nokia Shanghai Bell, RAN4#98bis-e * R4-2105725, Draft CR on test cases for inter-RAT measurement for NR-U, Huawei/HiSilicon, RAN4#98bis-e * R4-2105726, Introduction of test cases for L1-RSRP measurement accuracy with CCA serving cell, MediaTek inc.RAN4#98bis-e   + Changed the title of A.9.4.4 from "L1-RSRP measurements for beam reporting" to "L1-RSRP measurement for beam reporting with CCA serving cell"   + Changed the title of A.10.5.4 from "L1-RSRP measurements for beam reporting" to "L1-RSRP measurement for beam reporting with CCA serving cell"   + Changed the numbering from A.11.5.4 to A.11.6.4   + Changed the title of A.11.6.4 from "L1-RSRP measurements for beam reporting" to "L1-RSRP measurement for beam reporting with CCA serving cell" * R4-2105727, Draft CR on test cases for intra-frequency measurement accuracy for NR-U, Huawei/HiSilicon, RAN4#98bis-e * R4-2105728, Test cases for RSSI and CO measurement accuracy in NR-U R16, Apple, RAN4#98bis-e * R4-2105714 Applicability rules for legacy NR tests for NR-U in 38.133, Ericsson, RAN4#98bis-e * R4-2105713, Draft CR on DL CCA model for NR-U, Nokia/Nokia Shanghai Bell, Ericsson, RAN4#98bis-e * R4-2106873, Draft CR: Update of RMC for NR-U test cases, Ericsson, RAN4#98bis-e * R4-2105718, Draft CR of test cases for HO delay and interruption for NR-U, Huawei/HiSilicon, RAN4#98bis-e * R4-2105719, Draft CR on test cases for RRC release with redirection for NR-U, Huawei/HiSilicon, RAN4#98bis-e * R4-2105723, Draft CR of test cases for PSCell addition and release for NR-U, Huawei/HiSilicon, RAN4#98bis-e * R4-2106977, Draft CR of test case configurations for NR-U, Huawei/HiSilicon, RAN4#98bis-e   Change #3:   * R4-2017091, Measurement accuracy requirements for NR-U, Ericsson | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No NR-U measurement accuracy requirements and no NR-U test cases will be specified | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | New clauses:  9.11.4, 9.11.5, 9.11.6, 10.1.27, 10.1.28, 10.1.29, 10.1.30, 10.1.31, 10.1.32, 10.1.33, 10.1.34, 10.1.35;  A.3.1A, A.3.6A, A.3.7A, A.3.10A, A.3.19, A.3.20, A.3.21;  A.9, A.9.1, A.9.2, A.9.3;  A.10, A.10.1, A.10.2, A.10.3, A.10.4, A.10.5;  A.11, A.11.1, A.11.2, A.11.3, A.11.4, A.11.5, A.11.6;  A.12, A.12.1, A.12.2, A.12.3, A.12.4, A.12.5;  B.2.8, B.2.9, B.2.10, B.2.10.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | The draft big CR is based on earlier endorsed draft big CRs:   * R4-2103532 (from RAN4#98-e), * R4-2017352 (from RAN4#97-e). | | | | | | | | |

**--- start of change 1 ---**

### 9.11.4 NR SS-RSRP Measurements under CCA

The accuracy requirements of NR SS-RSRP measurements under CCA in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRP Absolute Accuracy Requirements under CCA in TS 38.133 [50] subclause 10.1.27.1.

The measurement period of NR SS-RSRP measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.1.2.4.21A for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-RSRP measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.1.2.4.22A for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation. For UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRP measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.17.4A.1. For for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period under CCA of NR SS-RSRP measurements in RRC\_CONNECTED state is specified in Sections 8.17.4A.2.

The reporting range and mapping specified for SS-RSRP measurements in TS 38.133 [50] subclause 10.1.6 shall apply.

### 9.11.5 NR SS-RSRQ Measurements under CCA

The accuracy requirements of NR SS-RSRQ measurements under CCA in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRQ Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.30.1.

The measurement period of NR SS-RSRQ measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.1.2.4.21A for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-RSRQ measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.1.2.4.22A for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation. For for UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRQ measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.17.4A.1. For for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRQ measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.17.4A.2.

The reporting range and mapping specified for SS-RSRQ measurements in TS 38.133 [50] subclause 10.1.11 shall apply.

### 9.11.6 NR SS-SINR Measurements under CCA

The accuracy requirements of NR SS-SINR measurements under CCA in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-SINR Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.32.1.

The measurement period of NR SS-SINR measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.1.2.4.21A for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-SINR measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.1.2.4.22A for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation. For for UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-SINR measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.17.4A.1. For for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-SINR measurements under CCA in RRC\_CONNECTED state is specified in Sections 8.17.4A.2.

The reporting range and mapping specified for SS-SINR measurements in TS 38.133 [50] subclause 10.1.16 shall apply.

**--- unchanged clauses ---**

### 10.1.27 Intra-frequency RSRP accuracy requirements under CCA

#### 10.1.27.1 Intra-frequency SS-RSRP accuracy requirements in FR1

##### 10.1.27.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell under CCA.

The accuracy requirements in Table 10.1.27.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band for each relevant SSB.

Table 10.1.27.1.1-1: SS-RSRP intra-frequency absolute accuracy

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±4.5 | ±9 | ≥-6 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±8 | ±11 | ≥-6 | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.27.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell under CCA.

The accuracy requirements in Table 10.1.27.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band for each relevant SSB.

Table 10.1.27.1.2-1: SS-RSRP intra-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±2 | ±3 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3 | ±3 | ≥-6 | Note 3 | Note 3 | Note 3 | N/A | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.28 Inter-frequency RSRP accuracy requirements under CCA

#### 10.1.28.1 Inter-frequency SS-RSRP accuracy requirements in FR1

##### 10.1.28.1.1 Absolute Accuracy of SS-RSRP

The requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency under CCA that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.28.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant SSB.

Table 10.1.28.1.1-1: SS-RSRP inter-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±4.5 | ±9 | ≥-6 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±8 | ±11 | ≥-6 | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.28.1.2 Relative Accuracy of SS-RSRP

The relative accuracy of SS-RSRP in inter frequency case is defined as the RSRP measured from one cell on a frequency compared to the RSRP measured from another cell on a different frequency, with at least one of the two frequencies being under CCA.

The accuracy requirements in Table 10.1.28.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- | Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.1.28.1.2-1: SS-RSRP inter-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±4.5 | ±6 | ≥-6 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.29 Intra-frequency RSRQ accuracy requirements under CCA

#### 10.1.29.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1.29.1.1 Absolute SS-RSRQ Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell under CCA.

The accuracy requirements in Table 10.1.29.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band for each relevant SSB.

Table 10.1.29.1.1-1: SS-RSRQ intra-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±2.5 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.30 Inter-frequency RSRQ accuracy requirements under CCA

#### 10.1.30.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

##### 10.1.30.1.1 Aboslute Accuracy of SS-RSRQ

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency under CCA that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.30.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant SSB.

Table 10.1.30.1.1-1: SS-RSRQ inter-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±2.5 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

##### 10.1.30.1.2 Relative Accuracy of SS-RSRQ

The relative accuracy of SS-RSRQ in inter-frequency case is defined as the RSRQ measured from one cell on a frequency compared to the RSRP measured from another cell on a different frequency, with at least one of the two frequencies being under CCA.

The accuracy requirements in Table 10.1.30.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band for each relevant SSB.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- | Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.1.30.1.2-1: SS-RSRQ inter-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| **dB** | **dB** | **dB** |  | **dBm / SCSSSB** | | **dBm/BWChannel** | **dBm/BWChannel** |
|  |  |  |  | **SCSSSB = 15 kHz** | **SCSSSB = 30 kHz** |  |  |
| ±3 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±4 | ±4 | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.31 Intra-frequency SINR accuracy requirements under CCA

10.1.31.1 Intra-frequency SS-SINR accuracy requirements in FR1

10.1.31.1.1 Absolute SS-SINR Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell under CCA.

The accuracy requirements in Table 10.1.31.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.8 for a corresponding Band.

Table 10.1.31.1.1-1: SS-SINR intra-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 3 | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±3.0 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.32 Inter-frequency SINR accuracy requirements under CCA

10.1.32.1 Inter-frequency SS-SINR accuracy requirements in FR1

10.1.32.1.1 Aboslute Accuracy of SS-SINR

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency under CCA that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.32.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band.

Table 10.1.32.1.1-1: SS-SINR inter-frequency absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 3 | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 4 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±3.0 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | 116.5 | -113.5 |
| ±3.5 | ±4 | ≥-6 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 3: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 4: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

10.1.32.1.2 Relative Accuracy of SS-SINR

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency compared to the SS-SINR measured from another cell on a different frequency, with at least one of the two frequencies being under CCA.

The accuracy requirements in Table 10.1.32.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.9 for a corresponding Band.

- |SSB\_RP1dBm - SSB\_RP2dBm| ≤ 27 dB

- | Channel 1\_Io ‑Channel 2\_Io | ≤ 20 dB

Table 10.1.32.1.2-1: SS-SINR inter-frequency relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  | Note 2,4 | NR operating band groups Note 5 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 120 kHz | SCSSSB = 240 kHz |  |  |
| ±3.5 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±4 | ±4 | ≥-6 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of cells to which the requirement applies.  NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.  NOTE 4: The requirements apply for SSB Ês/Iot ≤ 25 dB.  NOTE 5: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.33 L1-RSRP accuracy requirements under CCA

10.1.33.1 SSB based L1-RSRP accuracy requirements in FR1

10.1.33.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement under CCA.

The accuracy requirements in Table 10.1.33.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.10.1 for a corresponding Band for each relevant SSB.

Table 10.1.33.1.1-1: SSB based L1-RSRP absolute accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±5.0 | ±9.5 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| ±8.5 | ±11.5 | ≥-3 | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

10.1.33.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell under CCA.

The accuracy requirements in Table 10.1.33.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3F of TS 38.101-1 [18] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.10.1 for a corresponding Band for each relevant SSB.

Table 10.1.33.1.2-1: SSB based L1-RSRP relative accuracy under CCA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | | |
| Normal condition | Extreme condition | SSB Ês/Iot Note 2 | Io Note 1 range | | | | |
|  |  |  | NR operating band groups Note 3 | Minimum Io | | | Maximum Io |
| dB | dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| ±3 | ±4 | ≥-3 | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -50 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: The parameter SSB Ês/Iot is the minimum SSB Ês/Iot of the pair of SSBs to which the requirement applies.  NOTE 3: NR operating band groups are as defined in clause 3.5.2. | | | | | | | |

### 10.1.34 RSSI measurements under CCA

#### 10.1.34.1 Intra-frequency absolute RSSI measurement accuracy requirements in FR1

The accuracy requirements for intra-frequency RSSI measurements on a carrier frequency under CCA are specified in Table 10.1.34.1-1. The requirements apply for any configured RSSI *measDuration* [2], provided that:

- All symbols duing each RSSI measurement duration are available for RSSI sampling within the same reporting interval.

The intra-frequency RSSI measurement bandwidth is the channel bandwidth defined in Clause 4 of TS 37.213 [33], where the channel has the center frequency configured by *ARFCN-valueNR*.

Table 10.1.34.1-1: Intra-frequency RSSI accuracy under CCA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Accuracy | | Conditions | | | | |
| Normal condition | Extreme condition | Io Note 1 range | | | | |
|  |  | NR operating band groups Note 2 | Minimum Io | | | Maximum Io |
| dB | dB |  | dBm / SCSSSB | | dBm/BWChannel | dBm/BWChannel |
|  |  |  | SCSSSB = 15 kHz | SCSSSB = 30 kHz |  |  |
| [±3.5] | [±6.5] | NR\_CCA\_FR1\_I | -117 | -114 | N/A | -70 |
| NR\_CCA\_FR1\_J | -116.5 | -113.5 |
| [±5.5] | [±8.5] | NR\_CCA\_FR1\_I | N/A | N/A | -70 | -50 |
| NR\_CCA\_FR1\_J |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.  NOTE 2: NR operating band groups are as defined in clause 3.5.2. | | | | | | |

#### 10.1.34.2 Inter-frequency absolute RSSI measurement accuracy requirements in FR1

The accuracy requirements for inter-frequency RSSI measurements on a carrier frequency under CCA are the same as specified in clause 10.1.34.1.

The inter-frequency RSSI measurement bandwidth is the channel bandwidth defined in Clause 4 of TS 37.213 [33], where the channel has the center frequency configured by *ARFCN-valueNR*.

#### 10.1.34.3 RSSI measurement report mapping

The reporting range of RSSI measurement is defined from -100 dBm to -25 dBm with 1 dBm resolution.

The mapping of the measured quantity is defined in Table 10.1.34.3-1. The range in the signalling may be larger than the guaranteed accuracy range, provided that the following condition is met:

the RSSI measurement bandwidth is the channel bandwidth defined in Clause 4 of TS 37.213 [33], where the channel has the center frequency configured by *ARFCN-valueNR*.

Table 10.1.34.3-1: RSSI measurement report mapping

|  |  |  |
| --- | --- | --- |
| Reported value | Measured quantity value | Unit |
| RSSI\_00 | RSSI < ‑100 | dBm |
| RSSI\_01 | -100 ≤ RSSI < ‑99 | dBm |
| RSSI\_02 | -99 ≤ RSSI < ‑98 | dBm |
| … | … | … |
| RSSI\_74 | -27 ≤ RSSI < -26 | dBm |
| RSSI\_75 | -26 ≤ RSSI < -25 | dBm |
| RSSI\_76 | -25 ≤ RSSI | dBm |

### 10.1.35 Channel occupancy measurements under CCA

#### 10.1.35.1 Intra-frequency channel occupancy measurement accuracy requirements in FR1

The UE shall be able to correctly evaluate the intra-frequency channel occupancy configured according to TS 38.331 [2], provided that the following conditions are met:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same reporting interval,

- RSSI at the UE receiver meets the following condition with respect to the configured *channelOccupancyThreshold* [2]:

RSSI at the UE receiver is below *channelOccupancyThreshold*-, or

RSSI at the UE receiver is above *channelOccupancyThreshold*+,

where  is the applicable RSSI measurement accuracy value from the RSSI measurement accuracy requirements specified in clause 10.1.34.1.

The channel occupancy measurement bandwidth is the same as the RSSI measurement bandwidth in Clause 10.1.34.1.

#### 10.1.35.2 Inter-frequency channel occupancy measurement accuracy requirements in FR1

The UE shall be able to correctly evaluate the inter-frequency channel occupancy configured according to TS 38.331 [2], provided that the following conditions are met:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same reporting interval,

- RSSI at the UE receiver meets the following condition with respect to the configured *channelOccupancyThreshold* [2]:

RSSI at the UE receiver is below *channelOccupancyThreshold*-, or

RSSI at the UE receiver is above *channelOccupancyThreshold*+,

where  is the applicable RSSI measurement accuracy value from the RSSI measurement accuracy requirements specified in clause 10.1.34.2.

The channel occupancy measurement bandwidth is the same as the RSSI measurement bandwidth in Clause 10.1.34.2.

**--- end of change 1 ---**

**--- start of change 2 ---**

## A.3.1A Reference measurement channels under CCA

### A.3.1A.1 PDSCH

#### A.3.1A.1.1 TDD

Table A.3.1A.1.1-1: PDSCH Reference Measurement Channels for SCS=30kHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | SR.1.1 CCA |  |  |  |  |  |  |
| Channel bandwidth | MHz | 40 |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Allocated resource blocks for PDSCH Note 1 |  | 24 |  |  |  |  |  |  |
| Allocated slots per Radio Frame |  |  |  |  |  |  |  |  |
| Radio frame containing SSB | slots | Note 5 |  |  |  |  |  |  |
| Radio frame not containing SSB | slots | Note 7 |  |  |  |  |  |  |
| MCS table |  | 64QAM |  |  |  |  |  |  |
| MCS index |  | 4 |  |  |  |  |  |  |
| Modulation |  | QPSK |  |  |  |  |  |  |
| Target Coding Rate |  | 1/3 |  |  |  |  |  |  |
| Number of control symbols |  | 2 |  |  |  |  |  |  |
| PDSCH mapping type |  | Type A |  |  |  |  |  |  |
| Information Bit Payload |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2 | bits | 1608 |  |  |  |  |  |  |
| For slots without RMSI | bits | 1864 |  |  |  |  |  |  |
| Number of Code Blocks per slot |  | 1 |  |  |  |  |  |  |
| Binary Channel Bits Per slot |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2, Note 4 | bits | 5184 |  |  |  |  |  |  |
| For slots without RMSI Note 6 | bits | 6048 |  |  |  |  |  |  |
| Note 1: Allocated outside the discovery burst transmission window in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.  Note 2: PDSCH is scheduled on the slots with RMSI.  Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].  Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.  Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10A.  Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.  Note 7: PDSCH is transmitted during the RMC burst as specified in A.3.1A.5. | | | | | | | | |

### A.3.1A.2 CORESET for RMSI scheduling

#### A.3.1A.2.1 TDD

Table A.3.1A.2.1-1: RMSI CORESET Reference Channel for SCS=30KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CR.1.1 CCA |  |  |  |  |  |  |
| Channel bandwidth | MHz | 40 |  |  |  |  |  |  |
| Subcarrier spacing | kHz | 30 |  |  |  |  |  |  |
| Allocated resource blocks for RMSI CORESET Note 7 |  | 48 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| SSB and RMSI CORESET multiplexing configuration Note 7 |  | Pattern 1 |  |  |  |  |  |  |
| Offset between SSB and RMSI CORESET Note 3, 7 | RB | 0 (Note 8) |  |  |  |  |  |  |
| Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4 |  | Index 0 |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Duration of RMSI CORESET Note 7 | symbols | 2 |  |  |  |  |  |  |
| DCI Format Note 1 |  | Note 2 |  |  |  |  |  |  |
| Aggregation level | CCE | 8 |  |  |  |  |  |  |
| DMRS precoder granularity |  | 6 |  |  |  |  |  |  |
| REG bundle size |  | 6 |  |  |  |  |  |  |
| Mapping from REG to CCE |  | Distributed |  |  |  |  |  |  |
| Cell ID |  | Note 5 |  |  |  |  |  |  |
| Payload (without CRC) | bits | Note 6 |  |  |  |  |  |  |
| Note 1: DCI formats are defined in TS 38.212.  Note 2: DCI format shall depend upon the test configuration.  Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.  Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].  Note 5: Cell ID shall depend upon the test configuration.  Note 6: Payload size shall depend upon the test configuration.  Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 4 in Table 13-4A in TS 38.213 [3].  Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC. | | | | | | | | |

### A.3.1A.3 CORESET for RMC scheduling

#### A.3.1A.3.1 TDD

Table A.3.1A.3.1-1: Control Channel RMC with SCS=30KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CCR.1.1 CCA | CCR.1.2 CCA |  |  |  |  |  |
| Channel bandwidth | MHz | 40 | 40 |  |  |  |  |  |
| Subcarrier spacing | kHz | 30 | 30 |  |  |  |  |  |
| Allocated resource blocks for CORESET Note 3 |  | 24 | 24 |  |  |  |  |  |
| Number of transmitter antennas |  | 1 | 1 |  |  |  |  |  |
| Duration of CORESET | symbols | 2 | 2 |  |  |  |  |  |
| REG bundle size |  | 6 | 6 |  |  |  |  |  |
| DMRS precoder granularity |  | Same as REG bundle size | Same as REG bundle size |  |  |  |  |  |
| CCE to REG mapping |  | Interleaved | Interleaved |  |  |  |  |  |
| Interleave n\_shift |  | 0 | 0 |  |  |  |  |  |
| Interleave size |  | 2 | 2 |  |  |  |  |  |
| Beamforming Pre-Coder |  | N/A | N/A |  |  |  |  |  |
| Aggregation level | CCE | 4 | 8 |  |  |  |  |  |
| DCI formats |  | Note 1 | Note 1 |  |  |  |  |  |
| Payload size (without CRC) | bits | 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. | | | | | | | | |

### A.3.1A.4 TDD UL/DL configuration

Table A.3.1A.4-1: TDD UL/DL configuration for SCS=30kHz

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | |
| Reference channel |  | TDDConf.1.1 CCA |  |  |
| *referenceSubcarrierSpacing* | kHz | N/A |  |  |
| TDD UL/DL pattern 1 |  | ‘3D1S4U’  S=’6DL:4GP:4UL’ |  |  |
| *dl-UL-TransmissionPeriodicity* | ms | N/A |  |  |
| *nrofDownlinkSlots* |  | N/A |  |  |
| *nrofDownlinkSymbols* |  | N/A |  |  |
| *nrofUplinkSlot* |  | N/A |  |  |
| *nrofUplinkSymbols* |  | N/A |  |  |
| TDD UL/DL pattern 2 |  | ‘DD’ |  |  |
| *dl-UL-TransmissionPeriodicity* | ms | N/A |  |  |
| *nrofDownlinkSlots* |  | N/A |  |  |
| *nrofDownlinkSymbols* |  | N/A |  |  |
| *nrofUplinkSlot* |  | N/A |  |  |
| *nrofUplinkSymbols* |  | N/A |  |  |
| Note 1: As specified in TS 38.213 [3] and TS 38.331 [2].  Note 2: Do not configure *tdd-UL-DL-ConfigurationCommon* using RRC configuration  Note 3: The UE will be scheduled via DCI according to the TDD pattern defined in the table. | | | | |

### A.3.1A.5 RMC burst transmission model

RMC not conveying RMSI is scheduled during the RMC burst. The length of the transmission burst in slots is defined as N. The burst transmission format is determined according to the steps below:

1. Select N randomly from a given set of the number of slots S1 = {1,3,5,8} with equal probability as the total length of RMC burst transmission format.
2. A uniform random variable from 0 to 1 is generated. If the random variable is less than PCCA\_DL, a burst of N fully occupied slots is transmitted. Otherwise, the RMC burst transmission is muted and the muting duration is the same as the number N of slots for determined burst format.

RMC burst transmission is scheduled outside discovery burst transmission window. If transmission occurred in the previous slot, transmission is muted for a duration of one slot. Additionaly, if the start time of the candidate RMC burst transmission is within 8 slots of the start of the discovery burst transmission window, RMC transmission is not performed.

**--- unchanged clauses ---**

## A.3.6A Antenna configurations with unlicensed bands

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

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

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

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

All tests in clause A.9, A.10, A.11, and A.12 are specified for UEs supporting 2RX. In this clause, the antenna connection method for applying 2RX tests to UEs supporting 4RX antenna ports is specified. No tests are currently specified in clause A.9, A.10, A.11 or A.12 which are applicable only to 4RX antenna ports, so 4RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs.

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

A.3.6A.1.1.2.1 Single carrier tests

For 4RX capable UEs supporting at least one 2RX band, the, all single carrier tests specified in clause A.9. A.10, A.11 and A.12 except those in A.9.4, A.10.5, A.11.6 and A.12.5 shall be tested on any band where 2RX is supported with the antenna connection specified in A.3.6A.1.1.2.4. For single carrier tests specified in clause A.9.4, A.10.5, A.11.6 or A.12.5, all tests shall be tested with the antenna connection specified in A.3.6A.1.1.2.4 for bands where 2RX is supported, and the antenna connection specified in A.3.6A.1.1.2.5 for bands where 4RX is supported.

For 4RX capable UEs which do not support any 2RX band, all tests specified in clauses A.9, A.10, A.11 and A.12 shall be tested using the antenna connection specified in clause A.3.6A.1.1.2.5. For radio link monitoring tests, the SNR levels are modified according to table A.3.6A.1.1.2.1-1 and table A.3.6A.1.1.2.1-2

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

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

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

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

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

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

A.3.6A.1.1.2.2 Carrier aggregation tests

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

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

A.3.6A.1.1.2.3 EN-DC tests

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

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

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

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

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

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

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

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

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

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

**--- unchanged clauses ---**

## A.3.7A EN-DC test setup with unlicensed bands

### A.3.7A.1 Introduction

### A.3.7A.2 E-UTRAN Serving Cell Parameters

#### A.3.7A.2.1 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) under CCA in FR1

Table A.3.7A.2.1-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with all NR cells under CCA in FR1. Unless otherwise stated within the test, all measurements in Annex A.4 and A.5 are performed only on the unlicensed NR carrier. The E-UTRA serving cell shall configured to not interfere with NR operation and the E-UTRA serving cell signal power shall not be critical to the test purpose.

Table A.3.7A.2.1-1: E-UTRAN cell specific test parameters for tests with all NR cells user CCA in FR1

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | E-UTRAN Cell |
| 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 | -104 |
| Ês/Noc | dB | 17 |
| Ês/Iot | dB | 17 |
| RSRP Note5 | dBm/15 kHz | -87 |
| SCH\_RP Note5 | dBm/15 kHz | -87 |
| Io Note5 | dBm/Ch BW | -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. | | |

**--- unchanged clauses ---**

## A.3.10A SSB Configurations under CCA

### A.3.10A.1 SSB Configurations under CCA for FR1

#### A.3.10A.1.1 SSB pattern 1 under CCA for semi-static channel access: SSB allocation for SSB SCS=30kHz in 40MHz

Table A.3.10A.1.1-1: SSB.1 CCA: SSB Pattern 1 for SSB SCS=30 kHz in 40 MHz channel

|  |  |
| --- | --- |
| **SSB Parameters** | **Values** |
| Channel bandwidth | 40 MHz |
| SSB SCS | 30 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSB indexes per SS-burst () | 1 |
| Number of SS/PBCH block candidates per SSB index | 1 |
| SS/PBCH block candidate position | 0 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 2 | 2-5 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves | |

#### A.3.10A.1.2 SSB pattern 2 under CCA for dynamic channel access: SSB allocation for SSB SCS=30kHz in 40MHz

Table A.3.10A.1.2-1: SSB.2 CCA: SSB Pattern 2 for SSB SCS=30 kHz in 40 MHz channel for semi-static channel access

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| Channel bandwidth | 40 MHz | |
| SSB SCS | 30 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSB indexes per SS-burst () | 1 | |
| Number of SS/PBCH block candidates per SSB index | 2 | |
| SS/PBCH block candidate position | 0 | 2 |
| SS/PBCH block index | 0 | 0 |
| Symbol numbers containing SSB Note 2 | 2-5 | 2-5 |
| Slot numbers containing SSB Note 2 | 0 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves | | |

#### A.3.10A.1.3 SSB pattern 3 under CCA for semi-static channel access: SSB allocation for SSB SCS=30 kHz in 40 MHz

Table A.3.10.1.3-1: SSB.3 CCA: SSB Pattern 3 for SSB SCS=30 kHz in 40 MHz channel

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| Channel bandwidth | 40 MHz | |
| SSB SCS | 30 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSB indexes per SS-burst () | 2 | |
| Number of SS/PBCH block candidates per SSB index | 1 | |
| SS/PBCH block candidate position | 0 | 1 |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSB Note 2 | 2-5 | 8-11 |
| Slot numbers containing SSB Note 2 | 0 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

#### A.3.10A.1.4 SSB pattern 4 under CCA for dynamic channel access: SSB allocation for SSB SCS=30 kHz in 40 MHz

Table A.3.10.1.4-1: SSB.4 CCA: SSB Pattern 4 for SSB SCS=30 kHz in 40 MHz channel

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SSB Parameters** | **Values** | | | |
| Channel bandwidth | 40 MHz | | | |
| SSB SCS | 30 kHz | | | |
| SSB periodicity (TSSB) | 20 ms | | | |
| Number of SSB indexes per SS-burst () | 2 | | | |
| Number of SS/PBCH block candidates per SSB index | 2 | | | |
| SS/PBCH block candidate position | 0 | 2 | 1 | 3 |
| SS/PBCH block index | 0 | 0 | 1 | 1 |
| Symbol numbers containing SSB Note 2 | 2-5 | 2-5 | 8-11 | 8-11 |
| Slot numbers containing SSB Note 2 | 0 | 1 | 0 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | | | |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | | | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | | | |

**--- unchanged clauses ---**

## A.3.19 Test Cases with at Least One Cell on a Carrier Frequency with CCA

*Editor’s note: This clause will include applicability rules for the corresponding test cases.*

### A.3.19.1 Introduction

### A.3.19.2 NR Standalone Tests with NR SCell under CCA and All Other NR Cells in FR1

*Editor’s note: This clause will include applicability rules for the corresponding test cases.*

### A.3.19.3 EN-DC Tests with NR PSCell under CCA and Other NR Cells in FR1

*Editor’s note: This clause will include applicability rules for the corresponding test cases.*

### A.3.19.4 NR Standalone Tests with NR PCell under CCA and Other NR Cells in FR1

*Editor’s note: This clause will include applicability rules for the corresponding test cases.*

### A.3.19.5 E-UTRA Standalone Tests with at Least One NR Cell under CCA

*Editor’s note: This clause will include applicability rules for the corresponding test cases.*

## A.3.20 CCA model

### A.3.20.1 Introduction

The CCA model is used in some RRM test cases with at least one cell on a carrier frequency with CCA. The intention with the CCA model is to emulate in the test equipment the behaviour of a gNB or UE which performs channel measurement to check that the channel is clear prior to performing one or more downlink or uplink transmissions.

### A.3.20.2 CCA model for operation on a carrier frequency with CCA in FR1

#### A.3.20.2.1 DL CCA model

Prior to each DBT window, the test equipment shall determine whether the CCA attempt is successful (i.e., the corresponding signals have to be transmitted), based on probability PCCA\_DL of successful CCA configured in the corresponding test case.

If the CCA attempt is successful for a transmission, then the test equipment shall transmit also other remaining transmissions, according to the configuration, within the same DBT window.

If the CCA attempt is not successful for a transmission within the DBT window, the test equipment shall determine whether the CCA attempt is successful for the next configured transmission, based on probability PCCA\_DL.

The probability can be different in different time intervals Ti during a test case. One probability value (per TRP) applies at any time point during a test; one or more probability values can be configured in the entire test, one value PCCA\_DL per time interval Ti where i≥1, and the multiple time intervals (when i>1) do not overlap (e.g., PCCA\_DL=1.0 in T1 and PCCA\_DL=0.75 in T2).*.*

For semi-static channel access configuration, a single value PCCA\_DL is used to configure the probability of CCA success in different time intervals Ti during a test realization.

For dynamic channel access configuration, PCCA\_DL\_1 and PCCA\_DL\_2 are used to configure the probability of CCA success on the first and second SSB candidate positions, respectively, in different time intervals Ti during a test realization.

Prior to each discovery burst transmission window within a time interval Ti of the test, the test equipment shall:

1 - Generate a uniform random variable *p1* from the range [0, 1] for the first candidate position.

2 - Transmit the discovery burst based on *p1* in the first candidate position: if *p1* ≤ PCCA\_DL, the discovery burst is transmitted at first candidate SSB location; otherwise the discovery burst is muted.

3 - If two candidate SSB positions are modelled for a given SSB index in the test cases and CCA failed (*p1* > PCCA\_DL) for the first candidate SSB position, then:

a - Generate a uniform random variable *p2* from the range [0, 1] for the second candidate SSB position.

b - Transmit the discovery burst based on *p2* in the second candidate position: if *p2* ≤ PCCA\_DL2, the discovery burst is transmitted at the second candidate SSB location; otherwise the discovery burst is muted.

The above steps are repeated for each discovery burst transmission window in each time interval Ti of the test.

In many test cases, the requirement under a test depends on the number of configured SSB transmissions which are not available during the test due to CCA failure, so the test equipment shall track how many such signal occasions are not transmitted in DL during the test period.

*Editor’s note: FFS how to treat the case where the number of SSB occasions that are not transmitted in DL exceeds Lmax.*

#### A.3.20.2.2 UL CCA model

For UL CCA, the modelling approach is based on probability PCCA\_UL of successful CCA. Probability PCCA\_UL is configured in the corresponding test case, based on a set SCCA\_UL of possible values including TBD % as a typical value, 0% to model consistent UL CCA failures, and 100% to model no UL CCA failures.

Consistent UL CCA failures are modelled by configuring a low value for PCCA\_UL, e.g., PCCA\_UL = 0%.

In the same time interval Ti during the same test case, PCCA\_UL can be different from PCCA\_DL.

The probability can be different in different time intervals Ti during a test case. One probability value applies at any time point during a test; one or more probability values can be configured in the entire test, one value PCCA\_UL per time interval Ti where I ≥ 1, and the multiple time intervals (when I > 1) do not overlap (e.g., PCCA\_UL = 1.0 in T1 and PCCA\_UL = 0.75 in T2).

TCCA ms prior to each UL transmission burst in the test, the test equipment (TE) shall generate a uniform random variable p from the range [0, 1]. If p<PCCA\_UL, the TE transmits an [OCNG noise pattern] with an energy level [X] within the UE BW scheduled/configured for the UL transmission for at-least TCCA ms. TCCA is the channel sensing period depending on CCA category for the next UL transmission. The TE shall count the number of UL CCA failures. For each UL CCA failure generated by the model, the TE shall monitor the corresponding UL resource for the desired UL signal, and based on when and/or whether the TE received the desired UL signal, it deems the test case to pass or fail.

*Editor’s note: Energy level X is FFS and is higher than the LBT detection threshold.*

*Editor’s note:* *applicability of OCNG noise pattern is FFS.*

In many cases, the requirement under a test depends on the number of configured signal occasions which are not available during the test, so the test equipment shall track how many such signal occasions are not transmitted in UL during the test period.

## A.3.21 Discovery Burst Transmission Window configuration under CCA

### A.3.21.1 DBT Window pattern 1: DBT Window period = 20 ms with DBT Window duration = 1 ms

Table A.3.21.1-1: DBT.1: DBT Window Pattern 1 for DBT Window period = 20 ms and duration = 1 ms

|  |  |
| --- | --- |
| SMTC Parameters | Values |
| Discovery burst transmission window periodicity | 20 ms |
| Discovery burst transmission window offset | 0 ms |
| Discovery burst transmission window duration | 1 ms |

## A.3.22 Testing principles for UE capable of only NR bands with shared spectrum access

### A.3.22.1 Introduction

In annex A test cases are defined involving one or more NR cells operating on NR band(s) with shared spectrum channel access. The NR bands with shared spectrum channel access are defined in clause 5.2 of TS 38-101-1 [18].

### A.3.22.2 Principle of testing for UE capable of EN-DC with only NR bands with shared spectrum access

In Annex A, test cases in table A.3.22.2-1 are defined for UE capable of EN-DC with only NR band(s) with shared spectrum access and are not required for UE supporting also other NR band(s) (i.e. band with no shared spectrum access). The EN-DC configurations are defined in clause of 5.5B of TS 38.101-3 [20].

Table A.3.22.2-1: Test cases applicable to UE supporting EN-DC with only NR bands with shared spectrum access

|  |  |  |
| --- | --- | --- |
| Test category | Section | Test case |
| Active BWP switching | A.10.3.5.2.1 | E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC |
| A.10.3.5.2.2 | E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC |
| A.10.3.5.3.1 | E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC |

### A.3.22.3 Principle of testing for UE capable of SA operation with only NR bands with shared spectrum access

In Annex A, test cases in table A.3.22.3-1 are defined for UE capable of NR SA operation with only NR band(s) with shared spectrum access and are not required for UE supporting also other NR band(s) (i.e. band with no shared spectrum access).

Table A.3.22.3-1: Test cases applicable to UE supporting SA operation with only NR bands with shared spectrum access

|  |  |  |
| --- | --- | --- |
| Test category | Section | Test case |
| Active BWP switching | A.11.4.5.2.1 | NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA |
| A.11.4.5.2.2 | NR FR1 DL active BWP switch with non-DRX in SA |
| A.11.4.5.3.1 | NR FR1 DL active BWP switch of Cell with non-DRX in SA |
|  |  |

# A.9 NR Standalone Tests with NR SCell under CCA and All Other NR Cells in FR1

## A.9.1 Timing

## A.9.1.1 UE transmit timing

## A.9.1.2 Timing advance

## A.9.2 Signalling characteristics

### A.9.2.1 Interruption

#### A.9.2.1.1 NR interruptions during SCell operations with CCA on SCell

##### A.9.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify NR PCell interruptions during SCell operations on an NR SCC with CCA, This test will verify the interruption requirements for NR PCell in NR SA specified in TS 38.133 clause 8.2.2 and 8.3A. Supported test configurations are shown in table A.9.2.1.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.9.2.1.1.1-2 and A.9.2.1.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 and Cell2 are PCell and SCell. Cell 1 is on a licenced band and cell 2 is subject to CCA. The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the PCell are continuously scheduled in DL. The power of signals on cell 1 and 2 is not modified during the test.

Prior to T1, a connection is started with cell 1 as the PCell, and measurements of cell 2 are configured with gap pattern 0, such that cell 2 is reported. This ensures that cell 2 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying Scell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the Scell is configured.

The point in time at which the MAC-CE message implying Scell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying Scell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying Scell release is received at the UE antenna connector, defines the start of time period T5.

Table A.9.2.1.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.9.2.1.1.1-2: General test parameters for Interruptions during measurements on deactivated NR SCC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 |  |
| Active PCell |  | Cell1 | PCell on NR RF channel number 1. |
| Configured dSCell |  | Cell2 | SCell on NR RF channel number 2 |
| CP length |  | Normal | Applicable to Cell1, Cell2 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| T1 | s | <10 |  |
| T2 | s | <10 |  |
| T3 | s | <10 |  |
| T4 | s | <10 |  |
| T5 | s | <10 |  |

Table A.9.2.1.1.1-3: NR cell specific test parameters for Interruptions during measurements on deactivated NR SCC

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell1 | | | | | Cell2 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| TDD configuration | Config 1 |  | --- | | | | | [TDDConf.2.1] | | | | |
| Config 2 | TDDConf.1.1 | | | | |
| Config 3 | TDDConf.2.1 | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | | 40: NRB,c = 106 | | | | |
| Config 3 | 40: NRB,c = 106 | | | | |
| DL CCA model | Config 1,2,3 |  | --- | | | | | As specified in clause A.3.20.2.1 | | | | |
| DL CCA probability PCCA\_DL | Config 1,2,3 |  | --- | | | | | TBD | | | | |
| Initial BWP  Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Dedicated DL BWP  Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | DLBWP.1.1 | | | | |
| Initial UL BWP  Configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Dedicated UL BWP  Configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | ULBWP.1.1 | | | | |
| PDSCH reference meassurement channel | Config 1 |  | SR.1.1 FDD | | | | | --- | | | | |
| Config 2 | SR.1.1 TDD | | | | |
| Config 3 | SR.2.1 TDD | | | | |
| RMSI CORESET  Parameters | Config 1 |  | CR.1.1 FDD | | | | | --- | | | | |
| Config 2 | CR.1.1 TDD | | | | |
| Config 3 | CR.2.1 TDD | | | | |
| PDCCH CORESET  Parameters | Config 1 |  | CCR.1.1 FDD | | | | | --- | | | | |
| Config 2 |  | CCR.1.1 TDD | | | | |
| Config 3 |  | CCR.2.1 TDD | | | | |
| TRS configuration | Config 1 |  | TRS.1.1 FDD | | | | | --- | | | | |
|  | Config 2 |  | TRS.1.1 TDD | | | | |
|  | Config 3 |  | TRS.1.2 TDD | | | | |
| OCNG Pattern | |  | OP.1 | | | | | [OP.1] | | | | |
| SSB configuration | Config 3 |  | TBD | | | | | TBD | | | | |
| SMTC Configuration | Config 3 |  | SMTC.1 | | | | | [SMTC.1] | | | | |
| DBT window configuration | Config 3 |  | --- | | | | | TBD | | | | |
| TCI state | |  | TCI.State.0 | | | | | --- | | | | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | | | | 1x2 Low | | | | |
| EPRE ratio of PSS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  | | | | |  | | | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  | | | | |  | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  | | | | |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  | | | | |  | | | | |
| NocNote 2 | Config 1,2,3 | dBm/15 kHz | -104 | | | | | -104 | | | | |
| NocNote 2 | Config 1,2 | dBm/SCS | -104 | | | | | -101 | | | | |
| Config 3 | -101 | | | | |
| SS-RSRP Note 3 | Config 1,2,3 | dBm/15 kHz | -87 | | | | | -87 | | | | |
| Ês/Iot | | dB | 17 | | | | | 17 | | | | |
| Ês/Noc | | dB | 17 | | | | | 17 | | | | |
| Propagation Condition | |  | AWGN | | | | | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For Cell 2 with CCA model, OCNG is transmitted only in slots with downlink transmission bursts and is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. | | | | | | | | | | | | |

##### A.9.2.1.1.2 Test Requirements

The UE shall meet the interruption requirements for SCell addition on the victim Pcell in clause 8.2.1 during time T1

The UE shall meet the interruption requirements for SCell activation on the victim Pcell in clause 8.2.1during time T2. There shall be a single interruption with time window as specified in clause 8.3A.2

The UE shall meet the interruption requirements for SCell deactivation on the victim PCell in clause 8.2.1during time T3. There shall be a single interruption with time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for deactivated SCell measurements on the victim PCell in clause 8.2.1 during time T4. The interruptions shall be within the time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for SCell release on the victim PCell in clause 8.2.1during time T5.

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

### A.9.2.2 SCell activation and deactivation delay

A.9.2.2.1 SCell Activation and Deactivation of known SCell under CCA, 160 ms SCell measurement cycle

A.9.2.2.1.1 Test Purpose and Environment

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

The supported test configurations are shown in Table A.9.2.2.1.1-1.

The test parameters are given in Table A.9.2.2.1.1-2 and cell-specific parameters in Table A.9.2.2.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in NR FR1, and Cell2 (SCell) on radio channel 2 (SCC) in NR with CCA. Before the test starts the UE is connected to Cell 1, but is not aware of Cell 2, as the UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted *m*, defines the start of time period T2. The UE shall be able to report a valid CSI in PCell for the activated SCell at latest in slot *m* + , as defined in clause 8.3A.2. The UE shall start reporting CSI in PCell in slot *m+* and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption shall fall within the time window specified in clause 8.3A.2. In case downlink CCA failures L1 or L4 exceeds L1,max or L4,max, respectively, the UE abandons the SCell activation procedure. In other case, at the end of T2 the test equipment sends a MAC message for deactivation of the SCell.

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

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

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received, while taking into account CCA failures on SCC.

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

**Table A.9.2.2.1.1-1: Supported test configurations for SCell Activation and Deactivation of known SCell under CCA, 160 ms SCell measurement cycle**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.9.2.2.1.1-2: General test parameters for known SCell activation with SCell under CCA, 160 ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two radio channels (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every second subframe |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ TAE as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | [7] | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | [1] | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.9.2.2.1.1-3: Cell specific test parameters for known FR1 SCell activation case with SCell under CCA, 160 ms SCell measurement cycle

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | | | |
| T1 | T2 | T3 | T1 | T2 | | T3 | |
| Duplex mode | Config 1 |  | FDD | | | TDD | | | | |
| Config 2,3 | TDD | | |
| TDD configuration | Config 1 |  | --- | | | TDDConf.2.1 | | | | |
| Config 2 | TDDConf.1.1 | | |
| Config 3 | TDDConf.2.1 | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | 40: NRB,c = 106 | | | | |
| Config 3 | 40: NRB,c = 106 | | |
| DL CCA model | |  | --- | | | As specified in clause A.3.20.2.1 | | | | |
| DL CCA probability PCCA\_DL | |  | --- | | | TBD | | TBD | | TBD |
| Initial downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | | | |
| Initial uplink BWP configuration | |  | ULBWP.0.1 | | | --- | | | | |
| Dedicated downlink BWP configuration | |  | DLBWP.0.2 | | | DLBWP.0.2 | | | | |
| Dedicated uplink BWP configuration | |  | ULBWP.0.1 | | | --- | | | | |
| TCI state | |  | TCI.State.0 | | | TCI.State.0 | | | | |
| TRS Configuration | Config 1 |  | TRS.1.1 FDD | | | [TRS.1.2 TDD] | | | | |
|  | Config 2 | TRS.1.1 TDD | | |
|  | Config 3 | TRS.1.2 TDD | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | --- | | | | |
| Config 2 | SR.1.1 TDD | | |
| Config 3 | SR.2.1 TDD | | |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | | | --- | | | | |
| Config 2 | CCR.1.1 TDD | | |
| Config 3 | CCR.2.1 TDD | | |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | | | --- | | | | |
| Config 2 | CR.1.1 TDD | | |
| Config 3 | CR.2.1 TDD | | |
| OCNG Patterns Note1 | |  | OP.1 | | | OP.1 | | | | |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | | | [SSB.2 FR1] | | | | |
| Config 3 | SSB.2 FR1 | | |
| SMTC configuration | |  | SMTC.1 | | | [SMTC.1] | | | | |
| DBT window configuration | |  | --- | | | TBD | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| *Noc* Note2 | Config 1,2 | dBm/15kHz | -104 | | | -104 | | | | |
| Config 3 |
| *Noc* Note2 | Config 1,2 | dBm/SCS | -104 | | | -101 | | | | |
| Config 3 | -101 | | |
| *Ês/Iot* | | dB | 17 | | | 17 | | | | |
| *Ês/Noc* | | dB | 17 | | | 17 | | | | |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -87 | | | -84 | | | | |
| Config 3 | -84 | | | -84 | | | | |
| Propagation condition | | - | AWGN | | | | | | | |
| Note 1: OCNG shall be used such that resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For Cell 2 with CCA model, OCNG is transmitted only in slots with downlink transmission bursts and is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc*to be fulfilled.  Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. | | | | | | | | | | |

A.9.2.2.1.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in slot *m+*1+

During T2, conditioned on that downlink CCA failures L1 and L4 experienced in the SCell fulfill L1 ≤ L1,max and L4 ≤ L4,max with L1,max = 2 and L4,max = 2, respectively, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in slot *m +* (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB + L1\*Trs + 5ms and TCSI\_reporting\_withCCA = TCSI\_reporting + L4\*TCSI-RS + TCSI\_ReportingDelay, as specified in clause 8.3A.2.

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

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

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

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

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

A.9.2.2.2 SCell Activation and Deactivation of known SCell under CCA, 320 ms SCell measurement cycle

A.9.2.2.2.1 Test Purpose and Environment

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

The supported test configurations are same as in Table A.9.2.2.1.1-1 above.

The test parameters are same as in Table A.9.2.2.1.1-2 above, except for parameters listed below in Table A.9.2.2.2.1-1. The cell-specific parameters are same as in Table A.9.2.2.1.1-3 above.

The test execution is the same as described in clause A.9.2.2.1 above, except that downlink CCA failures L2,1 and L2,2 with limits L2,1 ≤ L2,1,max and L2,2 ≤ L2,2,max replace L1 as described in clause 8.3A.2 for activation of known SCell with a measurement cycle larger than 160 ms.

Table A.9.2.2.2.1-1: General test parameters for known SCell activation with SCell under CCA, 320 ms SCell measurement cycle

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

A.9.2.2.2.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in slot *m+*1+

During T2, conditioned on that downlink CCA failures L2,1, L2,2 and L4 experienced in the SCell fulfill L2,1 ≤ L2,1,max, L2,2 ≤ L2,2,max and L4 ≤ L4,max with L2,1,max = 2, L2,2,max = 2 and L4,max = 2, respectively, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in slot *m +* (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB\_MAX + L2,1\*TSMTC\_MAX + (1 +L2,2)\*Trs + 5ms and TCSI\_reporting\_withCCA = TCSI\_reporting + L4\*TCSI-RS + TCSI\_ReportingDelay, as specified in clause 8.3A.2.

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

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

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

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

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

A.9.2.2.3 SCell Activation and Deactivation of unknown SCell under CCA

A.9.2.2.3.1 Test Purpose and Environment

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

The supported test configurations are same as in Table A.9.2.2.1.1-1 above.

The test parameters are same as in Table A.9.2.2.1.1-2 above, except for parameters listed below in Table A.9.2.2.3.1-1. The cell-specific parameters are same as in Table A.9.2.2.1.1-3 above.

The test execution is the same as described in clause A.9.2.2.1 above, except that downlink CCA failures L3,1 and L3,2 with limits L3,1 ≤ L3,1,max and L3,2 ≤ L3,2,max replace L1 as described in clause 8.3A.2 for activation of unknown SCell.

Table A.9.2.2.3.1-1: General test parameters for unknown SCell activation with SCell under CCA

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

A.9.2.2.3.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in slot *m+*1+

During T2, conditioned on that downlink CCA failures L3,1, L3,2 and L4 experienced in the SCell fulfill L3,1 ≤ L3,1,max, L3,2 ≤ L3,2,max and L4 ≤ L4,max with L3,1,max = 2, L3,2,max = 2 and L4,max = 2, respectively, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in slot *m +* (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, where Tactivation\_time\_withCCA = TFirstSSB\_MAX + (1 + L3,1)\*TSMTC\_MAX + (2 + L3,2)\*Trs + 5ms and TCSI\_reporting\_withCCA = TCSI\_reporting + L4\*TCSI-RS + TCSI\_ReportingDelay, as specified in clause 8.3A.2.

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

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

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

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

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

### A.9.2.3 Active TCI state switching delay

## A.9.3 Measurement procedure

### A.9.3.1 Intra-frequency measurements

#### A.9.3.1.1 Event-triggered reporting tests on SCC without gaps under non-DRX

##### A.9.3.1.1.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.9.3.1.1.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.9.3.1.1.2-1 and A.9.3.1.1.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the SCell, and it is indicated to the UE that event-triggered reporting with Event A3 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 Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

* In the first test (Test 1), the UE is configured with SS-RSRP as Event A3 measurement quantity.
* In the second test (Test 2), the UE is configured with SS-RSRQ as Event A3 measurement quantity.
* In the third test (Test 3), the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.9.3.1.1.2-1: Supported test configurations

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

Table A.9.3.1.1.2-2: General test parameters for intra-frequency event triggered reporting without gaps

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | Comment |
| Test 1 | Test 2 | Test 3 |
| Active PCell |  | 1, 2, 3 | Cell 1 | | |  |
| Active SCell |  | 1, 2, 3 | Cell 2 | | |  |
| Neighbour cell |  | 1, 2, 3 | Cell 3 | | | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1  2: Cell 2 and Cell 3 | | |  |
| DL CCA model |  |  | As specified in clause A.3.20.2.1 | | |  |
| UL CCA model |  |  | As specified in clause A.3.20.2.2 | | |  |
| SSB configuration |  | 1 | Cell 1: SSB.1 FR1  Cell 2,3: TBD | | |  |
|  |  | 2 | Cell 1: SSB.1 FR1  Cell 2,3: TBD | | |  |
|  |  | 3 | Cell 1: SSB.2 FR1  Cell 2,3: TBD | | |  |
| SMTC configuration |  | 1 | Cell 1: SMTC.2  Cell 2,3: N/A | | |  |
|  |  | 2 | Cell 1: SMTC.1  Cell 2,3: N/A | | |  |
|  |  | 3 | Cell 1: SMTC.1  Cell 2,3: N/A | | |  |
| DBT window configuration |  | 1, 2, 3 | Cell 1: N/A  Cell 2,3: TBD | | |  |
| A3-Offset | dB | 1, 2, 3 | -4.5 | | |  |
| Event A3 measurement quantity |  |  | SS-RSRP | SS-RSRQ | SS-SINR |  |
| CP length |  | 1, 2, 3 | Normal | | |  |
| Hysteresis | dB | 1, 2, 3 | 0 | | |  |
| Time To Trigger | s | 1, 2, 3 | 0 | | |  |
| Filter coefficient |  | 1, 2, 3 | 0 | | | L3 filtering is not used |
| DRX |  | 1, 2, 3 |  | | | OFF |
| Time offset between Cell 2 and Cell 3 |  | 1 | 3 ms | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | 2 | 3 ms | | | Synchronous cells |
|  |  | 3 | 3 ms | | | Synchronous cells |
| T1 | s | 1, 2, 3 | TBD | | |  |
| T2 | s | 1, 2, 3 | TBD | | |  |

Table A.9.3.1.1.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gaps

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2 | T1 | T2 | T1 | T2 |
| DL CCA probability PCCA\_DL |  | 1, 2, 3 | N/A | | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL |  | 1, 2, 3 | N/A | | TBD | TBD | TBD | TBD |
| TDD configuration |  | 1 | N/A | | TBD | | TBD | |
|  |  | 2 | TDDConf.1.1 | | TBD | | TBD | |
|  |  | 3 | TDDConf.2.1 | | TBD | | TBD | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | SR.1.1 TDD | |  | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | CR.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | CR.2.1 TDD | | TBD | | TBD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | CCR.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | CCR.2.1 TDD | | TBD | | TBD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | TBD | | TBD | |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | TRS.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | TRS.1.2 TDD | | TBD | | TBD | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | TBD | | TBD | |
|  |  | 2 | -98 | | TBD | | TBD | |
|  |  | 3 | -95 | | TBD | | TBD | |
| Note 2 | dBm/15 kHz | 1 | -98 | | TBD | | TBD | |
|  |  | 2 | -98 | | TBD | | TBD | |
|  |  | 3 | -95 | | TBD | | TBD | |
| Note 5 | dB | 1 | 4 | -1.46 | TBD | TBD | -Infinity | TBD |
|  |  | 2 |  |  | TBD | TBD | -Infinity | TBD |
|  |  | 3 |  |  | TBD | TBD | -Infinity | TBD |
| Note 5 | dB | 1 | 4 | 4 | TBD | TBD | -Infinity | TBD |
|  |  | 2 |  |  | TBD | TBD | -Infinity | TBD |
|  |  | 3 |  |  | TBD | TBD | -Infinity | TBD |
| SS-RSRP Note 3,5 | dBm/SCS kHz | 1 | -94 | -94 | TBD | TBD | -Infinity | TBD |
|  |  | 2 | -94 | -94 | TBD | TBD | -Infinity | TBD |
|  |  | 3 | -91 | -91 | TBD | TBD | -Infinity | TBD |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | TBD | TBD | TBD | TBD |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | TBD | TBD | TBD | TBD |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | TBD | TBD | TBD | TBD |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | | | |
| NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | | | |

##### A.9.3.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.9.3.1.2 Event-triggered reporting tests on SCC without gaps under DRX

##### A.9.3.1.2.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.9.3.1.2.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.9.3.1.2.2-1 and A.9.3.1.2.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the SCell, and it is indicated to the UE that event-triggered reporting with Event A3 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 Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

* In Test 1 and Test 2, the UE is configured with SS-RSRP as Event A3 measurement quantity.
* In Test 3 and Test 4, the UE is configured with SS-RSRQ as Event A3 measurement quantity.
* In Test 5 and Test 6, the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.9.3.1.2.2-1: Supported test configurations

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

Table A.9.3.1.2.2-2: General test parameters for intra-frequency event triggered reporting without gaps with DRX

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | | | | | | | Comment |
| Test 1 | | Test 2 | | Test 3 | | Test 4 | | Test 5 | Test 6 |  |
| Active PCell |  | 1, 2, 3 | Cell 1 | | | | | | | | | |  |
| Active SCell |  | 1, 2, 3 | Cell 2 | | | | | | | | | |  |
| Neighbour cell |  | 1, 2, 3 | Cell 3 | | | | | | | | | | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1  2: Cell 2 and Cell 3 | | | | | | | | | |  |
| DL CCA model |  |  | As specified in clause A.3.20.2.1 | | | | | | | | | |  |
| UL CCA model |  |  | As specified in clause A.3.20.2.2 | | | | | | | | | |  |
| SSB configuration |  | 1 | Cell 1: SSB.1 FR1  Cell 2,3: TBD | | | | | | | | | |  |
|  |  | 2 | Cell 1: SSB.1 FR1  Cell 2,3: TBD | | | | | | | | | |  |
|  |  | 3 | Cell 1: SSB.2 FR1  Cell 2,3: TBD | | | | | | | | | |  |
| SMTC configuration |  | 1 | Cell 1: SMTC.2  Cell 2,3: N/A | | | | | | | | | |  |
|  |  | 2 | Cell 1: SMTC.1  Cell 2,3: N/A | | | | | | | | | |  |
|  |  | 3 | Cell 1: SMTC.1  Cell 2,3: N/A | | | | | | | | | |  |
| DBT window configuration |  | 1, 2, 3 | Cell 1: N/A  Cell 2,3: TBD | | | | | | | | | |  |
| A3-Offset | dB | 1, 2, 3 | -4.5 | | | | | | | | | |  |
| Event A3 measurement quantity |  |  | SS-RSRP | | | SS-RSRQ | | | | SS-SINR | | |  |
| CP length |  | 1, 2, 3 | Normal | | | | | | | | | |  |
| Hysteresis | dB | 1, 2, 3 | 0 | | | | | | | | | |  |
| Time To Trigger | s | 1, 2, 3 | 0 | | | | | | | | | |  |
| Filter coefficient |  | 1, 2, 3 | 0 | | | | | | | | | | L3 filtering is not used |
| DRX |  | 1, 2, 3 | DRX.1 | DRX.2 | | DRX.1 | | DRX.2 | | DRX.1 | | DRX.2 |  |
| Time offset between Cell 2 and Cell 3 |  | 1 | 3 ms | | | | | | | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | 2 | 3 ms | | | | | | | | | | Synchronous cells |
|  |  | 3 | 3 ms | | | | | | | | | | Synchronous cells |
| T1 | s | 1, 2, 3 | TBD | | | | | | | | | |  |
| T2 | s | 1, 2, 3 | TBD | TBD | | TBD | | TBD | | TBD | | TBD |  |

Table A.9.3.1.2.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gaps

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2 | T1 | T2 | T1 | T2 |
| DL CCA probability PCCA\_DL |  | 1, 2, 3 | N/A | | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL |  | 1, 2, 3 | N/A | | TBD | TBD | TBD | TBD |
| TDD configuration |  | 1 | N/A | | TBD | | TBD | |
|  |  | 2 | TDDConf.1.1 | | TBD | | TBD | |
|  |  | 3 | TDDConf.2.1 | | TBD | | TBD | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | SR.1.1 TDD | |  | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | CR.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | CR.2.1 TDD | | TBD | | TBD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | CCR.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | CCR.2.1 TDD | | TBD | | TBD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | TBD | | TBD | |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | TRS.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | TRS.1.2 TDD | | TBD | | TBD | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | TBD | | TBD | |
|  |  | 2 | -98 | | TBD | | TBD | |
|  |  | 3 | -95 | | TBD | | TBD | |
| Note 2 | dBm/15 kHz | 1 | -98 | | TBD | | TBD | |
|  |  | 2 | -98 | | TBD | | TBD | |
|  |  | 3 | -95 | | TBD | | TBD | |
| Note 5 | dB | 1 | 4 | -1.46 | TBD | TBD | -Infinity | TBD |
|  |  | 2 |  |  | TBD | TBD | -Infinity | TBD |
|  |  | 3 |  |  | TBD | TBD | -Infinity | TBD |
| Note 5 | dB | 1 | 4 | 4 | TBD | TBD | -Infinity | TBD |
|  |  | 2 |  |  | TBD | TBD | -Infinity | TBD |
|  |  | 3 |  |  | TBD | TBD | -Infinity | TBD |
| SS-RSRP Note 3,5 | dBm/SCS kHz | 1 | -94 | -94 | TBD | TBD | -Infinity | TBD |
|  |  | 2 | -94 | -94 | TBD | TBD | -Infinity | TBD |
|  |  | 3 | -91 | -91 | TBD | TBD | -Infinity | TBD |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | TBD | TBD | TBD | TBD |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | TBD | TBD | TBD | TBD |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | TBD | TBD | TBD | TBD |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | | | |
| NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | | | |

##### A.9.3.1.2.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.9.3.1.3 Event-triggered reporting tests on SCC with per-UE gaps under non-DRX

##### A.9.3.1.3.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.9.3.1.3.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.9.3.1.3.2-1 and A.9.3.1.3.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the SCell, and it is indicated to the UE that event-triggered reporting with Event A3 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 Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

* In the first test (Test 1), the UE is configured with SS-RSRP as Event A3 measurement quantity.
* In the second test (Test 2), the UE is configured with SS-RSRQ as Event A3 measurement quantity.
* In the third test (Test 3), the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.9.3.1.3.2-1: Supported test configurations

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

Table A.9.3.1.3.2-2: General test parameters for intra-frequency event triggered reporting with per-UE gaps

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | Comment |
| Test 1 | Test 2 | Test 3 |
| Active PCell |  | 1, 2, 3 | Cell 1 | | |  |
| Active SCell |  | 1, 2, 3 | Cell 2 | | |  |
| Neighbour cell |  | 1, 2, 3 | Cell 3 | | | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1  2: Cell 2 and Cell 3 | | |  |
| Measurement gap type |  | 1, 2, 3 | Per-UE gaps | | |  |
| Measurement gap repitition periodicity | ms | 1, 2, 3 | 40 | | |  |
| Measurement gap length | ms | 1, 2, 3 | [6] | | |  |
| Measurement gap offset | ms | 1, 2, 3 | [39] | | |  |
| DL CCA model |  |  | As specified in clause A.3.20.2.1 | | |  |
| UL CCA model |  |  | As specified in clause A.3.20.2.2 | | |  |
| SSB configuration |  | 1 | Cell 1: SSB.1 FR1  Cell 2,3: TBD | | |  |
|  |  | 2 | Cell 1: SSB.1 FR1  Cell 2,3: TBD | | |  |
|  |  | 3 | Cell 1: SSB.2 FR1  Cell 2,3: TBD | | |  |
| SMTC configuration |  | 1 | Cell 1: SMTC.2  Cell 2,3: N/A | | |  |
|  |  | 2 | Cell 1: SMTC.1  Cell 2,3: N/A | | |  |
|  |  | 3 | Cell 1: SMTC.1  Cell 2,3: N/A | | |  |
| DBT window configuration |  | 1, 2, 3 | Cell 1: N/A  Cell 2,3: TBD | | |  |
| CSI-RS parameters in Cell 1 |  | 1 | CSI-RS.1.2 FDD resource #0 | | |  |
|  | 2 | CSI-RS.1.2 TDD resource #0 | | |  |
|  | 3 | CSI-RS.2.2 TDD resource #0 | | |  |
| A3-Offset | dB | 1, 2, 3 | -4.5 | | |  |
| Event A3 measurement quantity |  |  | SS-RSRP | SS-RSRQ | SS-SINR |  |
| CP length |  | 1, 2, 3 | Normal | | |  |
| Hysteresis | dB | 1, 2, 3 | 0 | | |  |
| Time To Trigger | s | 1, 2, 3 | 0 | | |  |
| Filter coefficient |  | 1, 2, 3 | 0 | | | L3 filtering is not used |
| DRX |  | 1, 2, 3 |  | | | OFF |
| Time offset between Cell 2 and Cell 3 |  | 1 | 3 ms | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | 2 | 3 ms | | | Synchronous cells |
|  |  | 3 | 3 ms | | | Synchronous cells |
| T1 | s | 1, 2, 3 | TBD | | |  |
| T2 | s | 1, 2, 3 | TBD | | |  |

Table A.9.3.1.3.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gap

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2 | T1 | T2 | T1 | T2 |
| DL CCA probability PCCA\_DL |  | 1, 2, 3 | N/A | | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL |  | 1, 2, 3 | N/A | | TBD | TBD | TBD | TBD |
| TDD configuration |  | 1 | N/A | | TBD | | TBD | |
|  |  | 2 | TDDConf.1.1 | | TBD | | TBD | |
|  |  | 3 | TDDConf.2.1 | | TBD | | TBD | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | SR.1.1 TDD | |  | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | CR.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | CR.2.1 TDD | | TBD | | TBD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | CCR.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | CCR.2.1 TDD | | TBD | | TBD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | TBD | | TBD | |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | TRS.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | TRS.1.2 TDD | | TBD | | TBD | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | DLBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | TBD | | TBD | |
|  |  | 2 | -98 | | TBD | | TBD | |
|  |  | 3 | -95 | | TBD | | TBD | |
| Note 2 | dBm/15 kHz | 1 | -98 | | TBD | | TBD | |
|  |  | 2 | -98 | | TBD | | TBD | |
|  |  | 3 | -95 | | TBD | | TBD | |
| Note 5 | dB | 1 | 4 | -1.46 | TBD | TBD | -Infinity | TBD |
|  |  | 2 |  |  | TBD | TBD | -Infinity | TBD |
|  |  | 3 |  |  | TBD | TBD | -Infinity | TBD |
| Note 5 | dB | 1 | 4 | 4 | TBD | TBD | -Infinity | TBD |
|  |  | 2 |  |  | TBD | TBD | -Infinity | TBD |
|  |  | 3 |  |  | TBD | TBD | -Infinity | TBD |
| SS-RSRP Note 3,5 | dBm/SCS kHz | 1 | -94 | -94 | TBD | TBD | -Infinity | TBD |
|  |  | 2 | -94 | -94 | TBD | TBD | -Infinity | TBD |
|  |  | 3 | -91 | -91 | TBD | TBD | -Infinity | TBD |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | TBD | TBD | TBD | TBD |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | TBD | TBD | TBD | TBD |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | TBD | TBD | TBD | TBD |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | | | |
| NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | | | |

##### A.9.3.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.9.3.1.4 Event-triggered reporting tests on SCC with per-UE gaps under DRX

##### A.9.3.1.4.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.9.3.1.4.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.9.3.1.4.2-1 and A.9.3.1.4.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the SCell, and it is indicated to the UE that event-triggered reporting with Event A3 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 Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

* In Test 1 and Test 2, the UE is configured with SS-RSRP as Event A3 measurement quantity.
* In Test 3 and Test 4, the UE is configured with SS-RSRQ as Event A3 measurement quantity.
* In Test 5 and Test 6, the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.9.3.1.4.2-1: Supported test configurations

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

Table A.9.3.1.4.2-2: General test parameters for intra-frequency event triggered reporting without gap with DRX

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | | | | | | | Comment |
| Test 1 | | Test 2 | | Test 3 | | Test 4 | | Test 5 | Test 6 |  |
| Active PCell |  | 1, 2, 3 | Cell 1 | | | | | | | | | |  |
| Active SCell |  | 1, 2, 3 | Cell 2 | | | | | | | | | |  |
| Neighbour cell |  | 1, 2, 3 | Cell 3 | | | | | | | | | | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1  2: Cell 2 and Cell 3 | | | | | | | | | |  |
| Measurement gap type |  | 1, 2, 3 | Per-UE gaps | | | | | | | | | |  |
| Measurement gap repitition periodicity | ms | 1, 2, 3 | 40 | | | | | | | | | |  |
| Measurement gap length | ms | 1, 2, 3 | [6] | | | | | | | | | |  |
| Measurement gap offset | ms | 1, 2, 3 | [39] | | | | | | | | | |  |
| DL CCA model |  |  | As specified in clause A.3.20.2.1 | | | | | | | | | |  |
| UL CCA model |  |  | As specified in clause A.3.20.2.2 | | | | | | | | | |  |
| SSB configuration |  | 1 | Cell 1: SSB.1 FR1  Cell 2,3: TBD | | | | | | | | | |  |
|  |  | 2 | Cell 1: SSB.1 FR1  Cell 2,3: TBD | | | | | | | | | |  |
|  |  | 3 | Cell 1: SSB.2 FR1  Cell 2,3: TBD | | | | | | | | | |  |
| SMTC configuration |  | 1 | Cell 1: SMTC.2  Cell 2,3: N/A | | | | | | | | | |  |
|  |  | 2 | Cell 1: SMTC.1  Cell 2,3: N/A | | | | | | | | | |  |
|  |  | 3 | Cell 1: SMTC.1  Cell 2,3: N/A | | | | | | | | | |  |
| DBT window configuration |  | 1, 2, 3 | Cell 1: N/A  Cell 2,3: TBD | | | | | | | | | |  |
| CSI-RS parameters in Cell 1 |  | 1 | CSI-RS.1.2 FDD resource #0 | | | | | | | | | |  |
|  | 2 | CSI-RS.1.2 TDD resource #0 | | | | | | | | | |  |
|  | 3 | CSI-RS.2.2 TDD resource #0 | | | | | | | | | |  |
| A3-Offset | dB | 1, 2, 3 | -4.5 | | | | | | | | | |  |
| Event A3 measurement quantity |  |  | SS-RSRP | | | SS-RSRQ | | | | SS-SINR | | |  |
| CP length |  | 1, 2, 3 | Normal | | | | | | | | | |  |
| Hysteresis | dB | 1, 2, 3 | 0 | | | | | | | | | |  |
| Time To Trigger | s | 1, 2, 3 | 0 | | | | | | | | | |  |
| Filter coefficient |  | 1, 2, 3 | 0 | | | | | | | | | | L3 filtering is not used |
| DRX |  | 1, 2, 3 | DRX.1 | DRX.2 | | DRX.1 | | DRX.2 | | DRX.1 | | DRX.2 |  |
| Time offset between Cell 2 and Cell 3 |  | 1 | 3 ms | | | | | | | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | 2 | 3 ms | | | | | | | | | | Synchronous cells |
|  |  | 3 | 3 ms | | | | | | | | | | Synchronous cells |
| T1 | s | 1, 2, 3 | TBD | | | | | | | | | |  |
| T2 | s | 1, 2, 3 | TBD | TBD | | TBD | | TBD | | TBD | | TBD |  |

Table A.9.3.1.4.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gap

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2 | T1 | T2 | T1 | T2 |
| DL CCA probability PCCA\_DL |  | 1, 2, 3 | N/A | | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL |  | 1, 2, 3 | N/A | | TBD | TBD | TBD | TBD |
| TDD configuration |  | 1 | N/A | | TBD | | TBD | |
|  |  | 2 | TDDConf.1.1 | | TBD | | TBD | |
|  |  | 3 | TDDConf.2.1 | | TBD | | TBD | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | SR.1.1 TDD | |  | |  | |
|  |  | 3 | SR.2.1 TDD | |  | |  | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | CR.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | CR.2.1 TDD | | TBD | | TBD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | CCR.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | CCR.2.1 TDD | | TBD | | TBD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | TBD | | TBD | |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | TBD | | TBD | |
|  |  | 2 | TRS.1.1 TDD | | TBD | | TBD | |
|  |  | 3 | TRS.1.2 TDD | | TBD | | TBD | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | DLBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | TBD | | TBD | |
|  |  | 2 | -98 | | TBD | | TBD | |
|  |  | 3 | -95 | | TBD | | TBD | |
| Note 2 | dBm/15 kHz | 1 | -98 | | TBD | | TBD | |
|  |  | 2 | -98 | | TBD | | TBD | |
|  |  | 3 | -95 | | TBD | | TBD | |
| Note 5 | dB | 1 | 4 | -1.46 | TBD | TBD | -Infinity | TBD |
|  |  | 2 |  |  | TBD | TBD | -Infinity | TBD |
|  |  | 3 |  |  | TBD | TBD | -Infinity | TBD |
| Note 5 | dB | 1 | 4 | 4 | TBD | TBD | -Infinity | TBD |
|  |  | 2 |  |  | TBD | TBD | -Infinity | TBD |
|  |  | 3 |  |  | TBD | TBD | -Infinity | TBD |
| SS-RSRP Note 3,5 | dBm/SCS kHz | 1 | -94 | -94 | TBD | TBD | -Infinity | TBD |
|  |  | 2 | -94 | -94 | TBD | TBD | -Infinity | TBD |
|  |  | 3 | -91 | -91 | TBD | TBD | -Infinity | TBD |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | TBD | TBD | TBD | TBD |
|  | dBm/9.36 MHz | 2 | -64.60 | -62.25 | TBD | TBD | TBD | TBD |
|  | dBm/38.16 MHz | 3 | -58.50 | -56.16 | TBD | TBD | TBD | TBD |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | | | |
| NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | | | |

##### A.9.3.1.4.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.9.3.1.5 RSSI measurement reporting on SCC

##### A.9.3.1.5.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

##### A.9.3.1.5.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.9.3.1.5.2-1. There are two cells in the test: Cell 1 is PCell on a licensed FR1 band, and Cell 2 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2.

Table A.9.3.1.5.2-1: Supported test configurations.

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

Table A.9.3.1.5.2-2: General test parameters.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| DL CCA model |  |  | N/A | PCCA\_DL=1.0 |
| UL CCA model |  |  | N/A | PCCA\_UL=1.0 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  |  | TBD | |
| PDSCH Reference measurement channel defined in TBD |  |  | TBD | TBD |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in TBD |  |  | TBD | TBD |
| OCNG Patterns defined in TBD |  |  | TBD | TBD |
| Other general configuration parameters: TBD |  |  | TBD | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Propagation condition |  | - | AWGN | |

#### A.9.3.1.6 Channel occupancy measurement reporting on SCC

##### A.9.3.1.6.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

##### A.9.3.1.6.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.9.3.1.6.2-1. There are two cells in the test: Cell 1 is PCell on a licensed FR1 band, and Cell 2 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2.

Table A.9.3.1.6.2-1: Supported test configurations.

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

Table A.9.3.1.6.2-2: General test parameters.

Editor’s note: Table is TBD

### A.9.3.2 Inter-frequency measurements

#### A.9.3.2.1 RSSI measurement reporting

##### A.9.3.2.1.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the inter-frequency RSSI measurement reporting requirements in Section 9.3A.8.

##### A.9.3.2.1.2 Test parameters

In the test, the UE is configured to perform inter-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.9.3.2.1.2-1. There are two cells in the test: Cell 1 is PCell on a licensed FR1 band, and Cell 2 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The RSSI measurement is performed on an inter-frequency under CCA.

Table A.9.3.2.1.2-1: Supported test configurations.

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

Table A.9.3.2.1.2-2: General test parameters.

Editor’s note: Table TBD

#### A.9.3.2.2 Channel occupancy measurement reporting

##### A.9.3.2.2.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the inter-frequency channel occupancy measurement reporting requirements in Section 9.3A.9.

##### A.9.3.2.2.2 Test parameters

In the test, the UE is configured to perform inter-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.9.3.2.2.2-1. There are two cells in the test: Cell 1 is PCell on a licensed FR1 band, and Cell 2 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The channel occupancy measurement is performed on an inter-frequency under CCA.

Table A.9.3.2.2.2-1: Supported test configurations.

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

Table A.9.3.2.2.2-2: General test parameters.

Editor’s note: Table is TBD

#### A.9.3.2.3 Event triggered reporting tests for FR1 with CCA without SSB time index detection when DRX is not used

##### A.9.3.2.3.1 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 SA inter-frequency NR cell search requirements for NR cell with CCA in clause 9.3A.4 and 9.3A.5.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.9.3.2.3.1-1, A.9.3.2.3.1-2 and A.9.3.2.3.1-3.

In test 1, measurement gap pattern configuration # 0 as defined in Table A.9.3.2.3.1-2 is provided for UE that does not support per-FR gap. In test 2, measurement gap pattern configuration #4 as defined in Table A.9.3.2.3.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

Table A.9.3.2.3.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode,  NR cell without CCA: 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.9.3.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2, 3 | | Three FR1 NR carrier frequencies are used. Channels 2 and 3 are with CCA. |
| Active cells |  | Config 1,2,3 | NR cell 1 (PCell), NR cell 2 with CCA (SCell) | | NR cell 1 is on NR RF channel number 1. NR cell 2 is on NR RF channel number 2 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 3 with CCA | | NR cell 3 is on NR RF channel number 3 with CCA. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3 | -6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| CP length |  | Config 1,2,3 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | [5] | |  |
| T2 | s | Config 1,2,3 | [1] | [1] |  |

Table A.9.3.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | |
| T1 | T2 | T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | 2 | | 3 | |
| Duplex mode | | |  | Config 1 | TDD | | TDD | | FDD | |
|  | Config 2,3 | TDD | | TDD | | TDD | |
| TDD configuration | | |  | Config 1 | Not Applicable | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
|  | Config 2 | TDDConf.1.1 | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
|  | Config 3 | TDDConf.2.1 | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| DL CCA probability PCCA\_DL | | |  |  | Not Applicable | | TBD | | TBD | |
| UL CCA probability PCCA\_UL | | |  |  | Not Applicable | | TBD | | TBD | |
| BWchannel | | | MHz | Config 1,2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | | MHz | Config 1,2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | DLBWP.0.1 | |  | |
| Initial UL BWP | |  | ULBWP.0.1 | | ULBWP.0.1 | |  | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | DLBWP.1.1 | |  | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | ULBWP.1.1 | |  | |
| TRS configuration | | |  | Config 1 | TRS.1.1 FDD | | TRS.1.2 TDD | |  | |
| Config 2 | TRS.1.1 TDD | | TRS.1.2 TDD | |  | |
| Config 3 | TRS.1.2 TDD | | TRS.1.2 TDD | |  | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 FDD | | SR.1.1 CCA | |  | |
| Config 2 | SR.1.1 TDD | | SR.1.1 CCA | |  | |
| Config 3 | SR2.1 TDD | | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 FDD | | CR.1.1 CCA | |  | |
| Config 2 | CR.1.1 TDD | | CR.1.1 CCA | |  | |
| Config 3 | CR2.1 TDD | | CR.1.1 CCA | |  | |
| SSB | | Semi- |  | Config 1 | SSB.1 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
| parameters | | static channel |  | Config 2 | SSB.1 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
|  | | acces |  | Config 3 | SSB.2 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
|  | | Dynamic |  | Config 1 | SSB.1 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
|  | | channel |  | Config 2 | SSB.1 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
|  | | access |  | Config 3 | SSB.2 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | | |  | Config 1,2,3 | Not Applicable | | As defined in A.3.21.1 | | As defined in A.3.21.1 | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 15 | | 30 | | 30 | |
| Config 2 | 15 | | 30 | | 30 | |
| Config 3 | 30 | | 30 | | 30 | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | -98 | | [-104] | | [-104] | |
| Note2 | | | dBm/SCS | Config 1,2 | -98 | | [-101] | | [-101] | |
| Config 3 | -95 | | [-101] | | [-101] | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -94 | -94 | -91 | -91 | -Infinity | -88 |
| Config 3 | -91 | -91 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1,2 | 4 | 4 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1,2 | 4 | 4 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | -58.49 | -58.49 | -63.94 | -56.15 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.9.3.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.9.3.2.4 Event triggered reporting tests for FR1 with CCA without SSB time index detection when DRX is used

##### A.9.3.2.4.1 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 SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.9.3.2.4.1-1, A.9.3.2.4.1-2 and A.9.3.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.9.3.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.9.3.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.9.3.2.4.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode,  NR cell without CCA: 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.9.3.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2, 3 | | | | Three FR1 NR carrier frequencies are used. Channels 2 and 3 are with CCA. |
| Active cells |  | Config 1,2,3 | NR cell 1 (PCell), NR cell 2 with CCA (SCell) | | | | NR cell 1 is on NR RF channel number 1. NR cell 2 is on NR RF channel number 2 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 3 with CCA | | | | NR cell 3 is on NR RF channel number 3 with CCA. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| CP length |  | Config 1,2,3 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | [5] | | | |  |
| T2 | s | Config 1,2,3 | [1.1] | [11] | [1.1] | [11] |  |

Table A.9.3.2.4.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | |
| T1 | T2 | T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | 2 | | 3 | |
| Duplex mode | | |  | Config 1 | TDD | | TDD | | FDD | |
|  | Config 2,3 | TDD | | TDD | | TDD | |
| TDD configuration | | |  | Config 1 | Not Applicable | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
|  | Config 2 | TDDConf.1.1 | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
|  | Config 3 | TDDConf.2.1 | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| DL CCA probability PCCA\_DL | | |  |  | Not Applicable | | TBD | | TBD | |
| UL CCA probability PCCA\_UL | | |  |  | Not Applicable | | TBD | | TBD | |
| BWchannel | | | MHz | Config 1,2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | | MHz | Config 1,2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | DLBWP.0.1 | |  | |
| Initial UL BWP | |  | ULBWP.0.1 | | ULBWP.0.1 | |  | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | DLBWP.1.1 | |  | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | ULBWP.1.1 | |  | |
| TRS configuration | | |  | Config 1 | TRS.1.1 FDD | | TRS.1.2 TDD | |  | |
| Config 2 | TRS.1.1 TDD | | TRS.1.2 TDD | |  | |
| Config 3 | TRS.1.2 TDD | | TRS.1.2 TDD | |  | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 FDD | | SR.1.1 CCA | |  | |
| Config 2 | SR.1.1 TDD | | SR.1.1 CCA | |  | |
| Config 3 | SR2.1 TDD | | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 FDD | | CR.1.1 CCA | |  | |
| Config 2 | CR.1.1 TDD | | CR.1.1 CCA | |  | |
| Config 3 | CR2.1 TDD | | CR.1.1 CCA | |  | |
| SSB | | Semi- |  | Config 1 | SSB.1 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
| parameters | | static channel |  | Config 2 | SSB.1 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
|  | | acces |  | Config 3 | SSB.2 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
|  | | Dynamic |  | Config 1 | SSB.1 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
|  | | channel |  | Config 2 | SSB.1 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
|  | | access |  | Config 3 | SSB.2 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | | |  | Config 1,2,3 | Not Applicable | | As defined in A.3.21.1 | | As defined in A.3.21.1 | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 15 | | 30 | | 30 | |
| Config 2 | 15 | | 30 | | 30 | |
| Config 3 | 30 | | 30 | | 30 | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | -98 | | [-104] | | [-104] | |
| Note2 | | | dBm/SCS | Config 1,2 | -98 | | [-101] | | [-101] | |
| Config 3 | -95 | | [-101] | | [-101] | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -94 | -94 | -91 | -91 | -Infinity | -88 |
| Config 3 | -91 | -91 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1,2 | 4 | 4 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1,2 | 4 | 4 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | -58.49 | -58.49 | -63.94 | -56.15 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.9.3.2.4.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table A.9.3.2.4.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.9.3.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.9.3.2.5 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is not used

##### A.9.3.2.5.1 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 SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.9.3.2.5.1-1, A.9.3.2.5.1-2 and A.9.3.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.9.3.2.5.1-2 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.9.3.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

Table A.9.3.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode,  NR cell without CCA: 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.9.3.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2, 3 | | Three FR1 NR carrier frequencies are used. Channels 2 and 3 are with CCA. |
| Active cells |  | Config 1,2,3 | NR cell 1 (PCell), NR cell 2 with CCA (SCell) | | NR cell 1 is on NR RF channel number 1. NR cell 2 is on NR RF channel number 2 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 3 with CCA | | NR cell 3 is on NR RF channel number 3 with CCA. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3 | -6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| CP length |  | Config 1,2,3 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | [5] | |  |
| T2 | s | Config 1,2,3 | [1] | [1] |  |

Table A.9.3.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | |
| T1 | T2 | T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | 2 | | 3 | |
| Duplex mode | | |  | Config 1 | TDD | | TDD | | FDD | |
|  | Config 2,3 | TDD | | TDD | | TDD | |
| TDD configuration | | |  | Config 1 | Not Applicable | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
|  | Config 2 | TDDConf.1.1 | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
|  | Config 3 | TDDConf.2.1 | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| DL CCA probability PCCA\_DL | | |  |  | Not Applicable | | TBD | | TBD | |
| UL CCA probability PCCA\_UL | | |  |  | Not Applicable | | TBD | | TBD | |
| BWchannel | | | MHz | Config 1,2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | | MHz | Config 1,2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | DLBWP.0.1 | |  | |
| Initial UL BWP | |  | ULBWP.0.1 | | ULBWP.0.1 | |  | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | DLBWP.1.1 | |  | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | ULBWP.1.1 | |  | |
| TRS configuration | | |  | Config 1 | TRS.1.1 FDD | | TRS.1.2 TDD | |  | |
| Config 2 | TRS.1.1 TDD | | TRS.1.2 TDD | |  | |
| Config 3 | TRS.1.2 TDD | | TRS.1.2 TDD | |  | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 FDD | | SR.1.1 CCA | |  | |
| Config 2 | SR.1.1 TDD | | SR.1.1 CCA | |  | |
| Config 3 | SR2.1 TDD | | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 FDD | | CR.1.1 CCA | |  | |
| Config 2 | CR.1.1 TDD | | CR.1.1 CCA | |  | |
| Config 3 | CR2.1 TDD | | CR.1.1 CCA | |  | |
| SSB | | Semi- |  | Config 1 | SSB.1 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
| parameters | | static channel |  | Config 2 | SSB.1 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
|  | | access |  | Config 3 | SSB.2 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
|  | | Dynamic |  | Config 1 | SSB.1 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
|  | | channel |  | Config 2 | SSB.1 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
|  | | access |  | Config 3 | SSB.2 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | | |  | Config 1,2,3 | Not Applicable | | As defined in A.3.21.1 | | As defined in A.3.21.1 | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 15 | | 30 | | 30 | |
| Config 2 | 15 | | 30 | | 30 | |
| Config 3 | 30 | | 30 | | 30 | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | -98 | | [-104] | | [-104] | |
| Note2 | | | dBm/SCS | Config 1,2 | -98 | | [-101] | | [-101] | |
| Config 3 | -95 | | [-101] | | [-101] | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -94 | -94 | -91 | -91 | -Infinity | -88 |
| Config 3 | -91 | -91 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1,2 | 4 | 4 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1,2 | 4 | 4 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | -58.49 | -58.49 | -63.94 | -56.15 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.9.3.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.9.3.2.6 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is used

##### A.9.3.2.6.1 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 SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.9.3.2.6.1-1, A.9.3.2.6.1-2 and A.9.3.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.9.3.2.6.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.9.3.2.6.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.9.3.2.6.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode,  NR cell without CCA: 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.9.3.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2, 3 | | | | Three FR1 NR carrier frequencies are used. Channels 2 and 3 are with CCA. |
| Active cells |  | Config 1,2,3 | NR cell 1 (PCell), NR cell 2 with CCA (SCell) | | | | NR cell 1 is on NR RF channel number 1. NR cell 2 is on NR RF channel number 2 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 3 with CCA | | | | NR cell 3 is on NR RF channel number 3 with CCA. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| CP length |  | Config 1,2,3 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | [5] | | | |  |
| T2 | s | Config 1,2,3 | [1.1] | [11] | [1.1] | [11] |  |

Table A.9.3.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | | Cell 3 | |
| T1 | T2 | T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | 2 | | 3 | |
| Duplex mode | | |  | Config 1 | TDD | | TDD | | FDD | |
|  | Config 2,3 | TDD | | TDD | | TDD | |
| TDD configuration | | |  | Config 1 | Not Applicable | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
|  | Config 2 | TDDConf.1.1 | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
|  | Config 3 | TDDConf.2.1 | | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| DL CCA probability PCCA\_DL | | |  |  | Not Applicable | | TBD | | TBD | |
| UL CCA probability PCCA\_UL | | |  |  | Not Applicable | | TBD | | TBD | |
| BWchannel | | | MHz | Config 1,2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | | MHz | Config 1,2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | DLBWP.0.1 | |  | |
| Initial UL BWP | |  | ULBWP.0.1 | | ULBWP.0.1 | |  | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | DLBWP.1.1 | |  | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | ULBWP.1.1 | |  | |
| TRS configuration | | |  | Config 1 | TRS.1.1 FDD | | TRS.1.2 TDD | |  | |
| Config 2 | TRS.1.1 TDD | | TRS.1.2 TDD | |  | |
| Config 3 | TRS.1.2 TDD | | TRS.1.2 TDD | |  | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 FDD | | SR.1.1 CCA | |  | |
| Config 2 | SR.1.1 TDD | | SR.1.1 CCA | |  | |
| Config 3 | SR2.1 TDD | | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 FDD | | CR.1.1 CCA | |  | |
| Config 2 | CR.1.1 TDD | | CR.1.1 CCA | |  | |
| Config 3 | CR2.1 TDD | | CR.1.1 CCA | |  | |
| SSB | | Semi- |  | Config 1 | SSB.1 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
| parameters | | static channel |  | Config 2 | SSB.1 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
|  | | access |  | Config 3 | SSB.2 FR1 | | SSB.1 CCA | | SSB.1 CCA | |
|  | | Dynamic |  | Config 1 | SSB.1 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
|  | | channel |  | Config 2 | SSB.1 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
|  | | access |  | Config 3 | SSB.2 FR1 | | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | | |  | Config 1,2,3 | Not Applicable | | As defined in A.3.21.1 | | As defined in A.3.21.1 | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 15 | | 30 | | 30 | |
| Config 2 | 15 | | 30 | | 30 | |
| Config 3 | 30 | | 30 | | 30 | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | -98 | | [-104] | | [-104] | |
| Note2 | | | dBm/SCS | Config 1,2 | -98 | | [-101] | | [-101] | |
| Config 3 | -95 | | [-101] | | [-101] | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -94 | -94 | -91 | -91 | -Infinity | -88 |
| Config 3 | -91 | -91 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1,2 | 4 | 4 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1,2 | 4 | 4 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | -58.49 | -58.49 | -63.94 | -56.15 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.9.3.2.6.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table A.9.3.2.6.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.9.3.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

### A.9.3.3 L1-RSRP measurements for beam reporting

#### A.9.3.3.1 SSB based L1-RSRP measurement when DRX is not used

##### A.9.3.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.9.3.3.1.1-1.

Table A.9.3.3.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.9.3.3.1.2 Test parameters

There are two cells in the tests, FR1 PCell (Cell 1) and FR1 SCell (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 and Cell 2 are given in Table A.9.3.3.1.2-1 and Table A.9.3.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.9.3.3.1.2-1: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Value |  |
|  |  |  | Cell 1 | Cell 2 |
| Active PCell/SCell Configuration |  |  | PCell | SCell |
| RF Channel Number |  |  | 1 | 2 |
| DL CCA model | 1~3 |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model | 1~3 |  | N/A | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | FDD | TDD |
|  | 2 |  | TDD |  |
|  | 3 |  | TDD |  |
| TDD Configuration | 1 |  | N/A | TDDConf.1.1 CCA |
|  | 2 |  | TDDConf.1.1 |  |
|  | 3 |  | TDDConf.2.1 |  |
| BWchannel | 1 | MHz | 10: NRB,c = 52 | 40: NRB,c = 106 |
|  | 2 |  | 10: NRB,c = 52 |  |
|  | 3 |  | 40: NRB,c = 106 |  |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | SR.1.1 CCA |
|  | 2 |  | SR.1.1 TDD |  |
|  | 3 |  | SR.2.1 TDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | CR.1.1 CCA |
|  | 2 |  | CR.1.1 TDD |  |
|  | 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | CCR.1.1 CCA |
|  | 2 |  | CCR.1.1 TDD |  |
|  | 3 |  | CCR.2.1 TDD |  |
| SSB configuration | 1 |  | SSB.3 FR1 | SSB.3 CCA for semi-static channel access |
|  | 2 |  | SSB.3 FR1 | SSB.4 CCA for dynamic channel access |
|  | 3 |  | SSB.4 FR1 |  |
| OCNG Patterns | 1~3 |  | OP.1 | OP.1 |
| Initial BWP Configuration | 1~3 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~3 |  | DLBWP.1.1  ULBWP.1.1 | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~3 |  | SMTC.1 | N/A |
| DBT Window Configuration | 1~3 |  | N/A | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.1 FDD | TRS.1.2 TDD |
|  | 2 |  | TRS.1.1 TDD |  |
|  | 3 |  | TRS.1.2 TDD |  |
| DRX configuration | 1~3 |  | Off | Off |
| reportConfigType | 1~3 |  | periodic | periodic |
| reportQuantity | 1~3 |  | ssb-Index-RSRP | ssb-Index-RSRP |
| Number of reported RS | 1~3 |  | 2 | 2 |
| L1-RSRP reporting period | 1~3 | slot | 80 | 80 |
| T1 | 1~3 | s | 5 | 5 |
| T2 | 1~3 | s | 1 | 1 |
| EPRE ratio of PSS to SSS | 1~3 | 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 DMRS |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |
| Propagation condition | 1~3 |  | AWGN | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | | |

Table A.9.9.3.1.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1,2,3 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1,2,3 |  | TBD | TBD | TBD | TBD |
| Note2 | 1,2,3 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2,3 | dBm/SSB SCS | -91.65 | | | |
|  | 1,2,3 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2,3 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2,3 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1,2,3 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS Res when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.9.3.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to 2xTTI DCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.9.3.3.2 SSB based L1-RSRP measurement when DRX is used

##### A.9.3.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.9.3.3.1.1-1.

Table A.9.3.3.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | Without CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.9.3.3.2.2 Test parameters

There are two cells in the tests, FR1 Pcell (Cell 1) and FR1 Scell (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 and Cell 2 are given in Table A.9.3.3.2.2-1 and Table A.9.3.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.9.3.3.2.2-1: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Value |  |
|  |  |  | Cell 1 | Cell 2 |
| Active Pcell/Scell Configuration |  |  | Pcell | Scell |
| RF Channel Number |  |  | 1 | 2 |
| DL CCA model | 1~3 |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model | 1~3 |  | N/A | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | FDD | TDD |
|  | 2 |  | TDD |  |
|  | 3 |  | TDD |  |
| TDD Configuration | 1 |  | N/A | TDDConf.1.1 CCA |
|  | 2 |  | TDDConf.1.1 |  |
|  | 3 |  | TDDConf.2.1 |  |
| BWchannel | 1 | MHz | 10: NRB,c = 52 | 40: NRB,c = 106 |
|  | 2 |  | 10: NRB,c = 52 |  |
|  | 3 |  | 40: NRB,c = 106 |  |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | SR.1.1 CCA |
|  | 2 |  | SR.1.1 TDD |  |
|  | 3 |  | SR.2.1 TDD |  |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | CR.1.1 CCA |
|  | 2 |  | CR.1.1 TDD |  |
|  | 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | CCR.1.1 CCA |
|  | 2 |  | CCR.1.1 TDD |  |
|  | 3 |  | CCR.2.1 TDD |  |
| SSB configuration | 1 |  | SSB.3 FR1 | SSB.3 CCA for semi-static channel access |
|  | 2 |  | SSB.3 FR1 | SSB.4 CCA for dynamic channel access |
|  | 3 |  | SSB.4 FR1 |  |
| OCNG Patterns | 1~3 |  | OP.1 | OP.1 |
| Initial BWP Configuration | 1~3 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~3 |  | DLBWP.1.1  ULBWP.1.1 | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~3 |  | SMTC.1 | N/A |
| DBT Window Configuration | 1~3 |  | N/A | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.1 FDD | TRS.1.2 TDD |
|  | 2 |  | TRS.1.1 TDD |  |
|  | 3 |  | TRS.1.2 TDD |  |
| DRX configuration | 1~3 |  | DRX.3 | DRX.3 |
| reportConfigType | 1~3 |  | periodic | periodic |
| reportQuantity | 1~3 |  | ssb-Index-RSRP | ssb-Index-RSRP |
| Number of reported RS | 1~3 |  | 2 | 2 |
| L1-RSRP reporting period | 1~3 | slot | 80 | 80 |
| T1 | 1~3 | s | 5 | 5 |
| T2 | 1~3 | s | 1 | 1 |
| EPRE ratio of PSS to SSS | 1~3 | 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 DMRS |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |  |
| Propagation condition | 1~3 |  | AWGN | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | | |

Table A.9.9.3.2.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1,2,3 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1,2,3 |  | TBD | TBD | TBD | TBD |
| Note2 | 1,2,3 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2,3 | dBm/SSB SCS | -91.65 | | | |
|  | 1,2,3 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2,3 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2,3 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1,2,3 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS Res when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.9.3.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to 2xTTI DCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.























## A.9.4 Measurement performance

### A.9.4.1 SS-RSRP

#### A.9.4.1.1 Intra-frequency measurement accuracy on a carrier frequency with CCA

##### A.9.4.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy on the carrier frequency with CCA is within the specified limits. This test will verify the requirements in clauses 10.1.27.1.1 and 10.1.27.1.2 for intra-frequency measurements under CCA.

##### A.9.4.1.1.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). Supported test configurations are shown in table A.9.4.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.9.4.1.1.2-2.

Table A.9.4.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR carrier with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR carrier without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR carrier with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR carrier without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR carrier with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR carrier without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.9.4.1.1.2-2: SS-RSRP Intra frequency test parameters

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | | Unit | Test 1 | | | Test 2 | | | | | | Test 3 | | | | | |
|  | | | | | |  | Cell 2 | Cell 3 | | Cell 2 | | Cell 3 | | | | Cell 2 | | | Cell 3 | | |
| Cell ID | | | | | |  | 489 | 0 | | 489 | | 0 | | | | 489 | | 0 | | | |
| SSB ARFCN | | | | | |  | freq1 | | | freq1 | | | | | | freq1 | | | | | |
| DL CCA model | | | | | |  | As specified in clause A.3.20.2.1 | | | | | | | | | | | | | | |
| UL CCA model | | | | | |  | As specified in clause A.3.20.2.2 | | | | | | | | | | | | | | |
| PCCA\_DL | | | | | |  | [TBD] | | | | | | | | | | | | | | |
| PCCA\_UL | | | | | |  | [TBD] | | | | | | | | | | | | | | |
| TDD configuration | | | | Config 1,2,3 | |  | TDDConf.1.1 CCA | | | | | | | | | | | | | | |
| BWchannel | | | | Config 1,2,3 | | MHz | 40: NRB,c = 106 | | | | | | | | | | | | | | |
| BWP BW | | | | Config 1,2,3 | |  | 40: NRB,c = 106 | | | | | | | | | | | | | | |
| CCA model | | | | Config 1,2,3 | |  | TBD | | | | | | | | | | | | | | |
| Downlink initial BWP configuration | | | | | |  | DLBWP.0.1 | | | | | | | | | | | | | | |
| Downlink dedicated BWP configuration | | | | | |  | DLBWP.1.1 | | | | | | | | | | | | | | |
| Uplink initial BWP configuration | | | | | |  | ULBWP.0.1 | | | | | | | | | | | | | | |
| Uplink dedicated BWP configuration | | | | | |  | ULBWP.1.1 | | | | | | | | | | | | | | |
| TRS configuration | | | | | Config 1,2,3 |  | TRS.1.2 TDD | | NA | | TRS.1.2 TDD | | | NA | TRS.1.2 TDD | | | | | | NA |
| DRX Cycle | | | | | | ms | Not Applicable | | | | | | | | | | | | | | |
| PDSCH Reference measurement channel | | | | Config 1,2,3 | |  | SR.1.1 CCA | | - | SR.1.1 CCA | | - | | | | SR.1.1 CCA | | | | | - |
| RMSI CORESET Reference Channel | | | | Config 1,2,3 | |  | CR.1.1 CCA | | - | CR.1.1 CCA | | - | | | | CR.1.1 CCA | | | | | - |
| Control channel RMC | | | | Config 1,2,3 | |  | CR.1.1 CCA | | - | CR.1.1 CCA | | - | | | | CR.1.1 CCA | | | | | - |
| SSB configuration for semi-static channel access | | | | Config 1,2,3 | |  | SSB.1 CCA | | SSB.1 CCA | SSB.1 CCA | | SSB.1 CCA | | | | SSB.1 CCA | | | | | SSB.1 CCA |
| SSB configuration for dynamic channel access | | | | Config 1,2,3 | |  | SSB.2 CCA | | SSB.2 CCA | SSB.2 CCA | | SSB.2 CCA | | | | SSB.2 CCA | | | | | SSB.2 CCA |
| DBT window configuration | | | | Config 1,2,3 | |  | DBT.1 | | DBT.1 | DBT.1 | | DBT.1 | | | | DBT.1 | | | | | DBT.1 |
| Time offset with Cell 1 | | Config 1,2,3 | | | | μs | - | | 3 | - | | 3 | | | | - | | | | 3 | |
| SMTC configuration | | Config 1,2,3 | | | |  | SMTC.1 | | | | | | | | | | | | | | |
| OCNG Patterns | | | | | |  | OCNG pattern 1 | | | | | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1,2,3 | | kHz | 30 kHz | | | | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | | dB | 0 | | 0 | 0 | | | 0 | | | | 0 | | | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH to PDSCH | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| Note2 | Config 1,2,3 | | | | NR\_TDD\_FR1\_I |  | Not applicableNote 5 | | | -94 | | | | | | | TBD | | | | |
| Note2 | Config 1,2,3 | NR\_TDD\_FR1\_I | | | | dBm/SCS | Not applicableNote 5 | | | -91 | | | | | | | TBD | | | | |
| Note6 | | | | | | dB | 2.46 | | -5.97 | 2.46 | | | -5.97 | | | | TBD | | | | TBD |
| Note6 | | | | | | dB | 6 | | 1 | 6 | | | 1 | | | | TBD | | | | TBD |
| SS-RSRPNote3,6 | Config 1,2,3 | | NR\_TDD\_FR1\_I | | | dBm/SCS | Not applicableNote 5 | | Not applicableNote 5 | -85 | | | -90 | | | | TBD | | | | TBD |
| IoNote3 | Config 1,2,3 | | | NR\_TDD\_FR1\_I | | dBm/  38.16MHz | Not applicableNote 5- | | | -51.99 | | | | | | | TBD | | | | |
| Propagation condition | | | | | | - | AWGN | | | | | | | | | | | | | | |
| Antenna configuration | | | | | |  | 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: Subtest 1 is not used when testing with 30kHz SSB SCS.  NOTE 6: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | | | | | | | | | | | | | | | | |

##### A.9.4.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.27.1.1 and relative requirement in clause 10.1.27.1.2.

### A.9.4.2 SS-RSRQ

### A.9.4.3 SS-SINR

### A.9.4.4 L1-RSRP measurement for beam reporting with CCA serving cell

#### A.9.4.4.1 SSB based L1-RSRP measurement

##### A.9.4.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.33.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.9.4.4.1.1-1.

Table A.9.4.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

##### A.9.4.4.1.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a SCell under CCA (Cell2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model.

Two sub-tests (Test 1 and Test 2) are provided with different *Noc* on Cell 2. The test parameters for the Cell 1 and Cell 2 are given in Table A.9.4.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.9.4.4.1.2-1.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. On Cell 2, UE is configured to perform L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.9.4.4.1.2-1: FR1 SSB based L1-RSRP test parameters

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Config | Unit | Test 1 | | | Test 2 | | |
| Cell 1 | Cell 2 | | Cell 1 | Cell 2 | |
| Active PCell/SCell Configuration | | 1~3 |  | PCell | SCell | | PCell | SCell | |
| SSB GSCN | | 1~3 |  | freq1 | freq2 | | freq1 | freq2 | |
| DL CCA model | | 1~3 |  | N/A | As specifieed in A.3.20.2.1 | | N/A | As specifieed in A.3.20.2.1 | |
| UL CCA model | | 1~3 |  | N/A | As specified in A.3.20.2.2 | | N/A | As specified in A.3.20.2.2 | |
| Duplex mode | | 1 |  | FDD | TDD | | FDD | TDD | |
| 2,3 |  | TDD | TDD |
| TDD configuration | | 1 |  | N/A | TDDConf.1.1 CCA | | N/A | TDDConf.1.1 CCA | |
| 2 |  | TDDConf.1.1 | TDDConf.1.1 |
| 3 |  | TDDConf.2.1 | TDDConf.2.1 |
| BWchannel | | 1 | MHz | 10: NRB,c = 52 | 40: NRB,c = 106 | | 10: NRB,c = 52 | 40: NRB,c = 106 | |
| 2 | 10: NRB,c = 52 | 10: NRB,c = 52 |
| 3 | 40: NRB,c = 106 | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | | 1 |  | SR.1.1 FDD | SR.1.1 CCA | | SR.1.1 FDD | SR.1.1 CCA | |
| 2 |  | SR.1.1 TDD | SR.1.1 TDD |
| 3 |  | SR.2.1 TDD | SR.2.1 TDD |
| RMSI CORESET Reference Channel | | 1 |  | CR.1.1 FDD | CR.1.1 CCA | | CR.1.1 FDD | CR.1.1 CCA | |
| 2 |  | CR.1.1 TDD | CR.1.1 TDD |
| 3 |  | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.1.1 FDD | CCR.1.1 CCA | | CCR.1.1 FDD | CCR.1.1 CCA | |
| 2 |  | CCR.1.1 TDD | CCR.1.1 TDD |
| 3 |  | CCR.2.1 TDD | CCR.2.1 TDD |
| SSB configuration for Semi-static channel access | | 1 |  | SSB.3 FR1 | SSB.3 CCA | | SSB.3 FR1 | SSB.3 CCA | |
| 2 |  | SSB.3 FR1 | SSB.3 FR1 |
| 3 |  | SSB.4 FR1 | SSB.4 FR1 |
| SSB configuration for Dynamic channel access | | 1 |  | SSB.3 FR1 | SSB.4 CCA | | SSB.3 FR1 | SSB.4 CCA | |
| 2 |  | SSB.3 FR1 | SSB.3 FR1 |
| 3 |  | SSB.4 FR1 | SSB.4 FR1 |
| TRS configuration | | 1 |  | TRS.1.1 FDD | TRS.1.2 TDD | | TRS.1.1 FDD | TRS.1.2 TDD | |
| 2 |  | TRS.1.1 TDD | TRS.1.1 TDD |
| 3 |  | TRS.1.2 TDD | TRS.1.2 TDD |
| OCNG Patterns | | 1~3 |  | OP.1 | | | OP.1 | | |
| Initial BWP Configuration | | 1~3 |  | DLBWP.0.1  ULBWP.0.1 | | | DLBWP.0.1  ULBWP.0.1 | | |
| Dedicated BWP configuration | | 1~3 |  | DLBWP.1.1  ULBWP.1.1 | | | DLBWP.1.1  ULBWP.1.1 | | |
| SMTC configuration | | 1~3 |  | SMTC.1 | | N/A | SMTC.1 | | N/A |
| DBT Window Configuration | | 1~3 |  | N/A | | DBT.1 | N/A | | DBT.1 |
| reportConfigType | | 1~3 |  | periodic | | | periodic | | |
| reportQuantity | | 1~3 |  | ssb-Index-RSRP | | | ssb-Index-RSRP | | |
| Number of reported RS | | 1~3 |  | 2 | | | 2 | | |
| L1-RSRP reporting period | | 1~3 |  | slot80 | | | slot80 | | |
| EPRE ratio of PSS to SSS | | 1~3 | 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 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 | 1~3 | dBm/15kHz | -94.65 | | | -94.65 | - | |
| 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\_TDD\_FR1\_I | - | -113 | |
| Note2 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 1~3 | dBm/SSB SCS | -91.65 | | | -91.65 | - | |
| 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\_TDD\_FR1\_I | - | -110 | |
|  | | 1~3 | dB | 10 | | | 10 | -3 | |
| SS-RSRPNote3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 1~3 | dBm/SCS | -81.65 | | | -81.65 | - | |
| 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\_TDD\_FR1\_I | - | -113 | |
| IoNote3 | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A NOTE 5 | 1~3 | dBm/  38.16MHz | -50.19 | | | -50.19 | - | |
| 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\_TDD\_FR1\_I | - | -77.19 | |
|  | | 1~3 | dB | 10 | | | 10 | -3 | |
| Propagation condition | | 1~3 |  | AWGN | | | AWGN | | |
| Antenna configuration | | 1~3 |  | 1x2 | | | 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: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: 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. | | | | | | | | | |

##### A.9.4.4.1.3 Test Requirements

In both Test 1 and Test 2, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.33.1.

### A.9.4.5 RSSI

### A.9.4.5.1 Intra-frequency RSSI measurement accuracy on a carrier with CCA

#### A.9.4.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

#### A.9.4.5.1.2 Test parameters

In all test cases, Cell 1 is the PCell on a licensed FR1 band and Cell 2 is the SCell with CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.9.4.5.1.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.9.4.5.1.2-2 and A.9.4.5.1.2-3.

Table A.9.4.5.1.2-1: Intra frequency RSSI supported test configurations

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

Table A.9.4.5.1.2-2: RSSI Intra frequency test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | SR.1.1 CCA |
| 2,3 | SR.1.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | CR.1.1 CCA |
| 2,3 | CR.1.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | CCR.1.1 CCA |
| 2,3 | CCR.1.1 TDD |
| OCNG Patterns |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |

Table A.9.4.5.1.2-3: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.9.4.5.1.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

### A.9.4.5.2 Inter-frequency RSSI measurement accuracy on a carrier with CCA

#### A.9.4.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.2.

#### A.9.4.5.2.2 Test parameters

In all test cases, Cell 1 is the PCell on a licensed FR1 band and Cell 2 is the neighbour with CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.9.4.5.2.2-1. The accuracy of RSSI inter-frequency measurements is tested by using the parameters in A.9.4.5.2.2-2 and A.9.4.5.2.3.

Table A.9.4.5.2.2-1: Inter frequency RSSI supported test configurations

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

Table A.9.4.5.2.2-2: RSSI Inter frequency test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | NA |
| 2,3 | SR.1.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | NA |
| 2,3 | CR.1.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | NA |
| 2,3 | CCR.1.1 TDD |
| OCNG Patterns |  |  | OP.1 | NA |
| EPRE ratio of PSS to SSS |  | dB | 0 | NA |
| 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) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |

Table A.9.4.5.2.2-3: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.9.4.5.2.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.2. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

### A.9.4.6 Channel occupancy

### A.9.4.6.1 Intra-frequency channel occupancy measurement accuracy on SCC with CCA

#### A.9.4.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

#### A.9.4.6.1.2 Test parameters

In all test cases, Cell 1 is the PCell on a licensed FR1 band and Cell 2 is the SCell with CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.9.4.6.1.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.9.4.6.1.2-2 and A.9.4.6.1.2-3.

Table A.9.4.6.1.2-1: Intra frequency CO supported test configurations

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

Table A.9.4.6.1.2-2: CO Intra frequency test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | SR.1.1 CCA |
| 2,3 | SR.1.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | CR.1.1 CCA |
| 2,3 | CR.1.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | CCR.1.1 CCA |
| 2,3 | CCR.1.1 TDD |
| OCNG Patterns |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |
| channelOccupancyThreshold |  | dBm | TBD | |

Table A.9.4.6.1.2-3: CO RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.9.4.6.1.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

### A.9.4.6.2 Inter-frequency channel occupancy measurement accuracy on a carrier with CCA

#### A.9.4.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.2.

#### A.9.4.6.2.2 Test parameters

In all test cases, Cell 1 is the PCell on a licensed FR1 band and Cell 2 is the neighbour with CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.9.4.6.2.2-1. The accuracy of channel occupancy inter-frequency measurements is tested by using the parameters in A.9.4.6.2.2-2 and A.9.4.6.2.3.

Table A.9.4.6.2.2-1: Inter frequency CO supported test configurations

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

Table A.9.4.6.2.2-2: CO Inter frequency test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | NA |
| 2,3 | SR.1.1 TDD |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | NA |
| 2,3 | CR.1.1 TDD |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | NA |
| 2,3 | CCR.1.1 TDD |
| OCNG Patterns |  |  | OP.1 | NA |
| EPRE ratio of PSS to SSS |  | dB | 0 | NA |
| 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) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |
| channelOccupancyThreshold |  | dBm | TBD | |

Table A.9.4.6.2.2-3: CO RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.9.4.6.2.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

# A.10 EN-DC Tests with NR PSCell under CCA and Other NR Cells in FR1

*Editor’s note: Test cases for EN-DC with NR PSCell under CCA and SCell under CCA are also included here.*

## A.10.1 RRC\_CONNECTED state mobility

### A.10.1.1 RRC connection mobility control

#### A.10.1.1.1 Random Access

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

###### A.10.1.1.1.1.1 Test Purpose and Environment

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

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

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

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

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Test-1 | Comments |
| SSB Configuration | Note 5, 7 | | | Config 1,2 |  | SSB.1 CCA | As defined in A.3.10A |
|  | Note 6, 7 | | | Config 1,2 |  | SSB.2 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1,2 |  | [DBT.1] | As specifeind in A.3.21.1 |
| DL CCA model | | | | Config 1,2 |  | As specifed in A.3.20.2.1 |  |
| UL CCA model | | | | Config 1,2 |  | As specifed in A.3.20.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1,2 |  | TDD |  |
| TDD Configuration | | | | Config 1,2 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | | | Config 1,2 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1,2 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | | | |  | FR1 PRACH configuration 1 | As defined in A.3.8.2. |
| DL CCA probability | | | Note 5, 7 | |  | TBD |  |
| PCCA\_DL | | | Note 6, 7 | |  | TBD |  |
| UL CCA probability | | | Note 5, 7 | |  | TBD |  |
| PCCA\_UL | | | Note 6, 7 | |  | TBD |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: Void  Note 4: 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 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | |

###### A.10.1.1.1.1.2 Test Requirements

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

A.10.1.1.1.1.2.1 Random Access Preamble Transmission

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

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

* The system simulator shall implement the UL CCA model of A.3.20.2 for the RACH occasions where PRACH transmissions are expected. The system simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.
* In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.
* In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.10.1.1.1.1.2.2 Random Access Response Reception

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

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.10.1.1.1.1.2.3 No Random Access Response Reception

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.10.1.1.1.1.2.4 Receiving an UL grant for msg3 retransmission

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

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

A.10.1.1.1.1.2.5 Contention Resolution Timer expiry

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

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

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

###### A.10.1.1.1.2.1 Test Purpose and Environment

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

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

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

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

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Test-1 | Comments |
| SSB Configuration | Note 5, 7 | | | Config 1,2 |  | SSB.1 CCA | As defined in A.3.10A |
|  | Note 6, 7 | | | Config 1,2 |  | SSB.2 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1,2 |  | [DBT.1] | As specifeind in A.3.21.1 |
| DL CCA model | | | | Config 1,2 |  | As specifed in A.3.20.2.1 |  |
| UL CCA model | | | | Config 1,2 |  | As specifed in A.3.20.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1,2 |  | TDD |  |
| TDD Configuration | | | | Config 1,2 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | | | Config 1,2 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1,2 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | | | |  | FR1 PRACH configuration 2 | As defined in A.3.8.2. |
|  | | | | |  |  |  |
|  | | | | |  |  |  |
| DL CCA probability | | | Note 5, 7 | |  | TBD |  |
| PCCA\_DL | | | Note 6, 7 | |  | TBD |  |
| UL CCA probability | | | Note 5, 7 | |  | TBD |  |
| PCCA\_UL | | | Note 6, 7 | |  | TBD |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: Void  Note 4: 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 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 7: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | |

###### A.10.1.1.1.2.2 Test Requirements

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

A.10.1.1.1.2.2.1 SSB-based Random Access Preamble Transmission

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

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

* The system simulator shall implement the UL CCA model of A.3.20.2 for the RACH occasions where PRACH transmissions are expected. The system simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.
* In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.
* In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.10.1.1.1.2.2.2 Random Access Response Reception

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

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.10.1.1.1.2.2.3 No Random Access Response Reception

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

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

###### A.10.1.1.1.3.1 Test Purpose and Environment

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

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

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

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

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Test-1 | Comments |
| SSB Configuration | Note 4, 6 | | | Config 1,2 |  | SSB.1 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1,2 |  | SSB.2 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1,2 |  | [DBT.1] | As specifeind in A.3.21.1 |
| DL CCA model | | | | Config 1,2 |  | As specifed in A.3.20.2.1 |  |
| UL CCA model | | | | Config 1,2 |  | As specifed in A.3.20.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1,2 |  | TDD |  |
| TDD Configuration | | | | Config 3,4 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 ­ | | | | Config 1,2 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP Note 2 | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP Note 2 | | | dBm/ SCS | -115 |  |
| Io | | | | Config 1,2 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | | | |  | FR1 MsgA configuration 1 | As defined in A.3.20.2.1. |
| *msgA-RSRP-ThresholdSSB* | | | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| DL CCA probability | | | Note 4, 6 | |  | TBD |  |
| PCCA\_DL | | | Note 5, 6 | |  | TBD |  |
| UL CCA probability | | | Note 4, 6 | |  | TBD |  |
| PCCA\_UL | | | Note 5, 6 | |  | TBD |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | |

###### A.10.1.1.1.3.2 Test Requirements

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

A.10.1.1.1.3.2.1 MsgA Transmission

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

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

* The system simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The system simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.
* In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure. In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.10.1.1.1.3.2.2 MsgB Reception

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

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

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

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.10.1.1.1.3.2.3 No MsgB Reception

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

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

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

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

###### A.10.1.1.1.4.1 Test Purpose and Environment

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

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

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

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

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Test-1 | Comments |
| SSB Configuration | Note 4, 6 | | | Config 1,2 |  | SSB.1 CCA | As defined in A.3.10A |
|  | Note 5, 6 | | | Config 1,2 |  | SSB.2 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1,2 |  | [DBT.1] | As specifeind in A.3.21.1 |
| DL CCA model | | | | Config 1,2 |  | As specifed in A.3.20.2.1 |  |
| UL CCA model | | | | Config 1,2 |  | As specifed in A.3.20.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1,2 |  | TDD |  |
| TDD Configuration | | | | Config 1,2 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | | | Config 1,2 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1,2 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1,2 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power (PCMAX,f,c) | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | | | |  | FR1 MsgA configuration 2 | As defined in A.3.20.2. |
| *msgA-RSRP-ThresholdSSB* | | | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
|  | | | | |  |  |  |
|  | | | | |  |  |  |
| DL CCA probability | | | Note 4, 6 | |  | TBD |  |
| PCCA\_DL | | | Note 5, 6 | |  | TBD |  |
| UL CCA probability | | | Note 4, 6 | |  | TBD |  |
| PCCA\_UL | | | Note 5, 6 | |  | TBD |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 6: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | |

###### A.10.1.1.1.4.2 Test Requirements

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

A.10.1.1.1.4.2.1 MsgA Transmission

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

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

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

* The system simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The system simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.
* In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.
* The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.10.1.1.1.4.2.2 MsgB Reception

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

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

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

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] , where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.10.1.1.1.4.2.3 No MsgB Reception

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

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

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

## A.10.2 Timing

### A.10.2.1 UE transmit timing

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

A.10.2.1.1.1 Test Purpose and environment

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test1** | **Test2** |
| SSB ARFCN |  | 1,2 | Freq1 | Freq1 |
| TDD configuration |  | 1,2 | TBD | |
| BWchannel | MHz | 1,2 | 40: NRB,c = 106 | |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | |
| DRX Cycle | ms | 1,2 | N/A | DRX.8Note5 |
| DL CCA model |  | 1,2 | As specified in clause A.3.20.2.1 | |
| UL CCA model |  | 1,2 | As specified in clause A.3.20.2.2 | |
| PDSCH Reference |  | 1,2 | TBD | |
| CORESET Reference |  | 1,2 | TBD | |
| OCNG Patterns |  | 1,2 | OCNG pattern 1 | |
| SSB configuration |  | 1,2 | TBD | |
| SMTC configuration |  | 1,2 | TBD | |
| TRS configuration |  | 1,2 | TBD | |
| DL CCA probability PCCA |  | 1,2 | TBD | TBD |
| UL CCA probability PCCA |  | 1,2 | TBD | TBD |
| EPRE ratio of PSS to SSS |  |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | dB | 1,2 | 0 | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| Note2 | dBm/30 kHz | 1,2 | -95 | -95 |
|  |  | 1,2 | 3 | 3 |
|  |  | 1,2 | 3 | 3 |
| SS-RSRPNote3 | dBm/30 kHz | 1,2 | -92 | -92 |
| IoNote3 | dBm/38.1MHz | 1,2 | -59.2 | -59.2 |
| Propagation condition |  | 1,2 | AWGN | |
| SRS Config |  | 1,2 | SRSConf.1Note6 | SRSConf.2Note6 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: DRX related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.10.2.1.1.1-3 | | | | |

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

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

A.10.2.1.1.2 Test requirements

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

Following will be the test sequence for this test

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

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

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

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

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

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

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

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

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

### A.10.2.2 UE timing advance

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

A.10.2.2.1.1 Test Purpose and Environment

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

A.10.2.2.1.2 Test Parameters

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

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

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

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

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

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

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

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test1** | |
|  | | |  | **T1** | **T2** |
| TDD configuration | | Config 1,2 |  | TBD | |
| BWchannel | | Config 1,2 | MHz | 40: NRB,c = 106 | |
| BWP BW | | Config 1,2 | MHz | 40: NRB,c = 106 | |
| DRX Cycle | | Config 1,2 | ms | Not Applicable | |
| DL CCA model | | Config 1,2 |  | As specified in clause A.3.20.2.1 | |
| UL CCA model | | Config 1,2 |  | As specified in clause A.3.20.2.2 | |
| PDSCH Reference | | Config 1,2 |  | TBD | |
| CORESET Reference | | Config 1,2 |  | TBD | |
| TRS configuration | | Config 1,2 |  | TBD | |
| OCNG Patterns | | Config 1,2 |  | OCNG pattern 1 | |
| SSB Configuration | | Config 1,2 |  | TBD | |
| SMTC configuration | | Config 1,2 |  | TBD | |
| DL CCA probability PCCA | | Config 1,2 |  | TBD | |
| UL CCA probability PCCA | | Config 1,2 |  | TBD | |
| EPRE ratio of PSS to SSS | | |  |  | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | |
| Note2 | Config 1,2 | | dBm/30 kHz | -95 | |
|  | Config 3,6 | |  | -95 | |
|  | | | dB | 3 | |
|  | | | dB | 3 | |
| IoNote3 | Config 1,2 | | dBm/38.16MHz | -62.58 | |
| Propagation condition | | | - | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

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

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

A.10.2.2.1.3 Test Requirements

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

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

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

## A.10.3 Signalling characteristics

### A.10.3.1 Radio link monitoring

#### A.10.3.1.1 Introduction

In the test cases specified in clause A.10.3.1, 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 based on the UE output power:

* 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.

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.

#### A.10.3.1.2 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

##### A.10.3.1.2.1 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 8.1A.

In the test, UE is configured to perform RLM based 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.10.3.1.2.1-1. The test parameters are given in Tables A.10.3.1.2.1-2, A.10.3.1.2.1-3, and A.10.3.1.2.1-4 below. There are two cells in the test: Cell 1 is the E-UTRAN PCell, and Cell 2 is the FR1 PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. 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.10.3.1.2.1-1 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. The UE transmits according to UL CCA model. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40 ms) in the test.

Table A.10.3.1.2.1-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.3.1.2.1-2: General test parameters for PSCell out-of-sync testing in non-DRX mode.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
| Test 1, Test 2 |
| Active E-UTRA PCell | | |  | Cell 1 |
| E-UTRA RF Channel Number | | |  | 1 |
| Active PSCell | | |  | Cell 2 |
| RF Channel Number | | |  | 2 |
| DL CCA model | | |  | As specified in clause A.3.20.2.1 |
| UL CCA model | | |  | As specified in clause A.3.20.2.2 |
| Duplex mode | | Config 1,2 |  | TDD |
| BWchannel | | Config 1,2 | MHz | 40: NRB,c = 106 |
| 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 |  | TBD |
| CORESET Reference Channel | | Config 1,2 |  | TBD |
| SSB configuration | | Config 1,2 |  | TBD |
| DBT window configuration | | Config 1,2 |  | TBD |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 |  | 30 kHz |
| PRACH Configuration | | Config 1,2 |  | TBD |
| 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 | TBD |
| T311 timer | | | ms | TBD |
| N310 | | |  | TBD |
| N311 | | |  | TBD |
| CSI-RS configuration for CSI reporting | | Config 1,2 |  | [CSI-RS.2.1 TDD] |
| CSI-RS for tracking | | Config 1,2 |  | [TRS.1.2 TDD] |
| T1 | | | s | TBD |
| T2 | | | s | TBD |
| T3 | | | s | TBD |
| D1 | | | s | TBD |
| 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.10.3.1.2.1-3: Cell-specific test parameters for PSCell out-of-sync testing in non-DRX mode.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | Test 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| DL CCA probability PCCA\_DL | | Note 6,8 |  | TBD | | | TBD | | |
| Note 7,8 |
| UL CCA probability PCCA\_UL | | |  | TBD | | | TBD | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB | 4 | | | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB | 0 | | | 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 |
| SNRNote 3,4 on RLM-RS | Config 1,2 | | dB | 1 | [-7] | -15 | 1 | TBD | TBD |
| SNR on other channels and signals | Config 1,2 | | dB | 1 | | | 1 | | |
|  | Config 1,2 | | dBm/SCS | -95 | | | -95 | | |
| Propagation condition | | |  | TDL-C 300 ns 100 Hz | | | TDL-C 300 ns 100 Hz | | |
| 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. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  NOTE 2: 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 transmitted SSS REs during DBT windows.  NOTE 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3, respectively, in Figure A.10.3.1.2.1-1.  NOTE 5: The SNR values are specified for testing a UE which supports 2 RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 is A.3.6.  NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 8: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | | |

Table A.10.3.1.2.1-4: Measurement gap configuration for PSCell out-of-sync testing in non-DRX mode.

|  |  |  |
| --- | --- | --- |
| Field | Test 1 | Test 2 |
| Value | Value |
| *gapOffset* | 0 | 0 |
| NOTE 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned.  NOTE 2: Ensure that RLM RS is partially overlapped with measurement gap. | | |

****

**Figure A.10.3.1.2.1-1: SNR variation for out-of-sync testing.**

##### A.10.3.1.2.2 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).

In Test 1, the UE is verified to meet the out-of-sync requirement for RLM-RS SSB Es/Iot <-7 dB.

In Test 2, the UE is verified to meet the out-of-sync requirement for RLM-RS SSB Es/Iot ≥-7 dB.

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

#### A.10.3.1.3 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

##### A.10.3.1.3.1 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. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1A.

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.10.3.1.3.1-1. The test parameters are given in Tables A.10.3.1.3.1-2, and A.10.3.1.3.1-3 below. There are two cells in the test: Cell 1 is the E-UTRAN PCell, and Cell 2 is the FR1 PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. 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.10.3.1.3.1-1 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. 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 transmits according to UL CCA model.

Table A.10.3.1.3.1-1: Supported test configurations.

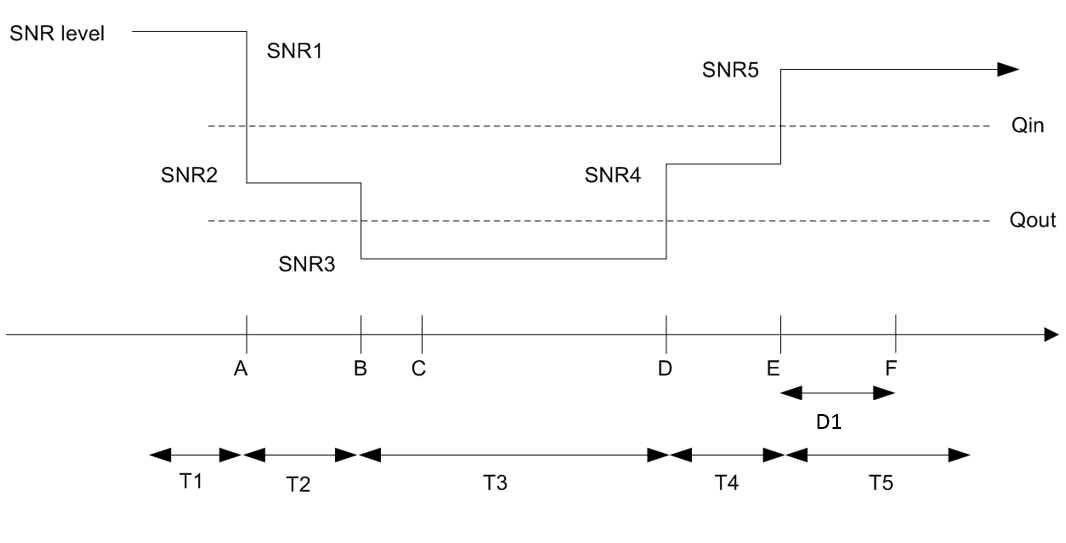
|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to pass in one of the supported test configurations above. | |

Table A.10.3.1.3.1-2: General test parameters for PSCell 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 |
| DL CCA model | | | |  | As specified in clause A.3.20.2.1 |
| UL CCA model | | | |  | As specified in clause A.3.20.2.2 |
| Duplex mode | | | Config 1,2 |  | TDD |
| BWchannel | | | Config 1,2 | MHz | 40: NRB,c = 106 |
| 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 |  | TBD |
| CORESET Reference Channel | | | Config 1,2 |  | TBD |
| SSB Configuration | | | Config 1,2 |  | TBD |
| DBT window configuration | | | Config 1,2 |  | TBD |
| PDSCH/PDCCH subcarrier spacing | | | Config 1,2 |  | 30 kHz |
| PRACH Configuration | | | Config 1,2 |  | TBD |
| 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 | TBD |
| T311 timer | | | | ms | TBD |
| N310 | | | |  | TBD |
| N311 | | | |  | TBD |
| CSI-RS configuration for CSI reporting | | Config 1,2 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1,2 | |  | TRS.1.2 TDD |
| T1 | | | | s | TBD |
| T2 | | | | s | TBD |
| T3 | | | | s | TBD |
| T4 | | | | s | TBD |
| T5 | | | | s | TBD |
| D1 | | | | s | TBD |
| 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.10.3.1.3.1-3: Cell-specific test parameters for PSCell in-sync testing in non-DRX mode.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
| T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA\_DL | |  | TBD | | | | |
| UL CCA probability PCCA\_UL | |  | TBD | | | | |
| 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 1,2 | dB | 1 | [-7] | [-15] | [-4.5] | 1 |
| SNR on other channels and signals | Config 1,2 | dB | 1 | | | | |
|  | Config 1,2 | dBm/SCS | -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. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  NOTE 2: 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 transmitted SSS REs during DBT windows.  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.10.3.1.2.1-1.  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 4 RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

****

**Figure A.10.3.1.2.1-1: SNR variation for in-sync testing.**

##### A.10.3.1.3.2 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.10.3.1.4 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode

##### A.10.3.1.4.1 Test purpose and environment

##### A.10.3.1.4.2 Test requirements

#### A.10.3.1.5 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in DRX mode

##### A.10.3.1.5.1 Test purpose and environment

##### A.10.3.1.5.2 Test requirements

### A.10.3.2 Interruption

#### A.10.3.2.1 E-UTRAN – NR interruptions during SCell operations with CCA

##### A.10.3.2.1.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during Scell operations on an NR SCC with CCA, This test will verify the interruption requirements for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1 and 8.3A. Supported test configurations are shown in table A.10.3.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.10.3.2.1.1-2 and A.10.3.2.1.1-3 below. The E-UTRAN cell specific test parameters are provided in Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR SCell. Both of cell 2 and cell 3 are subject to CCA. The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the LTE PCell and NR PSCell are continuously scheduled in DL. The power of signals on cell 1,2 and 3 is not modified during the test.

Prior to T1, a connection is started with cell 2 as the PSCell, and measurements of cell 3 are configured with gap pattern 0, such that cell 3 is reported. This ensures that cell 3 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying SCell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the SCell is configured.

The point in time at which the RRC message implying SCell addition is received at the UE antenna connector, defines the start of time period T1.

The point in time at which the MAC-CE message implying SCell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying SCell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying SCell release is received at the UE antenna connector, defines the start of time period T5.

Table A.10.3.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

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

Table A.10.3.2.1.1-2: General test parameters for Interruptions during measurements on deactivated NR SCC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is E-UTRAN RF channel and the other two are NR RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on NR RF channel number 3. |
| CP length |  | Normal | Applicable to Cell1, Cell2 and Cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| T1 | s | <10 |  |
| T2 | s | <10 |  |
| T3 | s | <10 |  |
| T4 | s | <10 |  |
| T5 | s | <10 |  |

Table A.10.3.2.1.1-3: NR cell specific test parameters for Interruptions during measurements on deactivated NR SCC

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | | | | | Cell3 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| TDD configuration | Config 1,2 |  | [TDDConf.2.1] | | | | | [TDDConf.2.1] | | | | |
| BWchannel | Config 1,2 | MHz | 40: NRB,c = 106 | | | | | 40: NRB,c = 106 | | | | |
| DL CCA model | Config 1,2 |  | As specified in clause A.3.20.2.1 | | | | | As specified in clause A.3.20.2.1 | | | | |
| DL CCA probavility PCCA\_DL | Config 1,2 |  | TBD | | | | | TBD | | | | |
| UL CCA model | Config 1,2 |  | As specified in clause A.3.20.2.2 | | | | | --- | | | | |
| UL CCA probavility PCCA\_UL | Config 1,2 |  | TBD | | | | | --- | | | | |
| Initial BWP  Configuration | Config 1,2 |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Dedicated DL BWP  Configuration | Config 1,2 |  | DLBWP.1.1 | | | | | DLBWP.1.1 | | | | |
| Initial UL BWP  Configuration | Config 1,2 |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Dedicated UL BWP  Configuration | Config 1,2 |  | ULBWP.1.1 | | | | | ULBWP.1.1 | | | | |
| PDSCH reference meassurement channel | Config 1,2 |  | [SR.2.1 TDD] | | | | | - | | | | |
| RMSI CORESET  Parameters | Config 1,2 |  | [CR.2.1 TDD] | | | | | [CR.2.1 TDD] | | | | |
| PDCCH CORESET  Parameters | Config 1,2 |  | [CCR.2.1 TDD] | | | | | [CCR.2.1 TDD] | | | | |
| TRS configuration | Config 1,2 |  | [TRS.1.2 TDD] | | | | | [TRS.1.2 TDD] | | | | |
| OCNG Patterns | |  | OP.1 | | | | | OP.1 | | | | |
| SSB configuration | Config 1,2 |  | TBD | | | | | TBD | | | | |
| SMTC Configuration | Config 1,2 |  | [SMTC.1] | | | | | [SMTC.1] | | | | |
| DBT window configuration | Config 1,2 |  | TBD | | | | | TBD | | | | |
| TCI state | |  | TCI.State.0 | | | | | TCI.State.0 | | | | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | | | | 1x2 Low | | | | |
| EPRE ratio of PSS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  | | | | |  | | | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  | | | | |  | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  | | | | |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  | | | | |  | | | | |
| NocNote 2 | | dBm/15 kHz | -104 | | | | | -104 | | | | |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | | | | | -87 | | | | |
| Ês/Iot | | dB | 17 | | | | | 17 | | | | |
| Ês/Noc | | dB | 17 | | | | | 17 | | | | |
| IoNote3 | Config 1,2 | dBm/38.16MHz | -52.86 | | | | | -52.86 | | | | |
| Time offset to Cell1 Note 4 | | ms | 3 | | | | | 3 | | | | |
| Time offset to Cell2 Note 5 | | μs | - | | | | | 3 | | | | |
| Propagation Condition | |  | AWGN | | | | | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. | | | | | | | | | | | | |

##### A.10.3.2.1.2 Test Requirements

The UE shall meet the interruption requirements for SCell addition on both the victim PSCC in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T1

The UE shall meet the interruption requirements for SCell activation on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T2. There shall be a single interruption with time window as specified in clause 8.3A.2

The UE shall meet the interruption requirements for SCell deactivation on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T3. There shall be a single interruption with time window as specified in clause 8.3A,3

The UE shall meet the interruption requirements for deactivated SCell measurements on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T43. The interruptions shall be within the time window as specified in clause 8.3A,3

The UE shall meet the interruption requirements for SCell release on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T5.

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

### A.10.3.3 SCell activation and deactivation delay

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

A.10.3.3.1.1 Test Purpose and Environment

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

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

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

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in E-UTRA, Cell 2 (PSCell) on radio channel 2 (PSCC) in NR, and Cell3 (SCell) on radio channel 3 (SCC) in NR. Before the test starts the UE is connected to Cell 1 and Cell 2, but is not aware of Cell 3, as the UE is only monitoring PCC and PSCC. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on radio channel 2. The UE now starts monitoring the SCC. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted *m*, defines the start of time period T2. The UE shall be able to report a valid CSI in PSCell for the activated SCell at latest in slot *m* + (THARQ+ Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, as defined in clause 8.3A.2. The UE shall start reporting CSI in PSCell in first available uplink resource for CSI reporting following slot *m+* and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption shall fall within the time window specified in clause 8.3A.2.

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

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

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received, while taking into account CCA failures on SCC.

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

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

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | PCC: LTE FDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | PCC: LTE TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode;  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.10.3.3.1.1-2: General test parameters for known SCell activation case with NR PSCell and SCell under CCA, 160 ms SCell measurement cycle**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2,3 | Three radio channels (1, 2, 3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1. |
| Active PSCell |  | Cell 2 | Primary secondary cell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every second subframe |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell 3 timing offset to Cell 2 | μs | 0 |  |
| Time alignment error between Cell 3 and Cell 2 | μs | ≤ TAE as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | [7] | During this time PCell and PSCell shall be known and the SCell configured and detected. |
| T2 | s | [1] | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | | | | | **Cell 3** | | | | |
| **T1** | | **T2** | | **T3** | **T1** | **T2** | | **T3** | |
| Duplex mode | Config 1,2 |  | TDD | | | | | TDD | | | | |
| TDD configuration | Config 1,2 |  | TDDConf.2.1 | | | | | TDDConf.2.1 | | | | |
| BWchannel | Config 1,2 | MHz | 40: NRB,c = 106 | | | | | 40: NRB,c = 106 | | | | |
| DL CCA model | |  | As specified in clause A.3.20.2.1 | | | | | As specified in clause A.3.20.2.1 | | | | |
| UL CCA model | |  | As specified in clause A.3.20.2.2 | | | | | --- | | | | |
| DL CCA probability PCCA | |  | TBD | TBD | | TBD | | TBD | | TBD | | TBD |
| UL CCA probability PCCA | |  | TBD | TBD | | TBD | | --- | | | | |
| Initial downlink BWP configuration | |  | DLBWP.0.2 | | | | | DLBWP.0.2 | | | | |
| Initial uplink BWP configuration | |  | ULBWP.0.1 | | | | | --- | | | | |
| Dedicated downlink BWP configuration | |  | DLBWP.0.2 | | | | | DLBWP.0.2 | | | | |
| Dedicated uplink BWP configuration | |  | ULBWP.0.1 | | | | | --- | | | | |
| TCI state | |  | TCI.State.0 | | | | | TCI.State.0 | | | | |
| TRS Configuration | Config 1,2 |  | [TRS.1.2 TDD] | | | | | [TRS.1.2 TDD] | | | | |
| PDSCH Reference measurement channel | Config 1,2 |  | [SR.2.1 TDD] | | | | | --- | | | | |
| Dedicated CORESET parameters | Config 1,2 |  | [CCR.2.1 TDD] | | | | | --- | | | | |
| RMSI CORESET parameters | Config 1,2 |  | [CR.2.1 TDD] | | | | | --- | | | | |
| OCNG Patterns Note1 | |  | OP.1 | | | | | OP.1 | | | | |
| SSB Configuration | Config 1,2 |  | [SSB.2 FR1] | | | | | [SSB.2 FR1] | | | | |
| SMTC configuration | |  | [SMTC.1] | | | | | [SMTC.1] | | | | |
| DBT window configuration | |  | TBD | | | | | TBD | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| *Noc* Note2 | Config 1,2 | dBm/15kHz | -104 | | | | | -104 | | | | |
| *Noc* Note2 | Config 1,2 | dBm/SCS | -101 | | | | | -101 | | | | |
| *Ês/Iot* | | dB | 17 | | | | | 17 | | | | |
| *Ês/Noc* | | dB | 17 | | | | | 17 | | | | |
| SS-RSRP Note3 | Config 1,2 | dBm/SCS | -84 | | | | | -84 | | | | |
| Propagation condition | | - | AWGN | | | | | | | | | |
| Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc*to be fulfilled.  Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. | | | | | | | | | | | | |

A.10.3.3.1.2 Test Requirements

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

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

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

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

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

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

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

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

A.10.3.3.2.1 Test Purpose and Environment

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

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

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

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

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

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

A.10.3.3.2.2 Test Requirements

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

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

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

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

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

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

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

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

A.10.3.3.3.1 Test Purpose and Environment

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

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

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

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

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

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

A.10.3.3.3.2 Test Requirements

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

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

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

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

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

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

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

### A.10.3.4 Beam failure detection and link recovery procedures

A.10.3.4.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.10.3.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate 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 SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5A.

The test parameters are given in Tables A.10.3.4.1.1-1, A.10.3.4.1.1-2, A.10.3.4.1.1-3 and A.10.3.4.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.10.3.4.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q0 in the active PSCell to emulate SSB based beam failure. Figure A.10.3.4.1.1-1 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 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA model. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40 ms) in test 1.

**Table A.10.3.4.1.1-1: Supported test configurations for FR1 PSCell with CCA**

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

**Table A.10.3.4.1.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Value** |  | **Comment** |
|  | | | | |  | **Test 1** | **Test 2** |  |
| Active E-UTRA PCell | | | | |  | Cell 1 | Cell 1 |  |
| E-UTRA RF Channel Number | | | | |  | 1 | 1 |  |
| Active PSCell | | | | |  | Cell 2 | Cell 2 |  |
| RF Channel Number | | | | |  | 2 | 2 |  |
| DL CCA model | | | | |  | As specifieed in A.3.20.2.1 | As specifieed in A.3.20.2.1 |  |
| UL CCA model | | | | |  | As specified in A.3.20.2.2 | As specified in A.3.20.2.2 |  |
| Duplex mode | | | | Config 1, 2 |  | TDD | TDD |  |
| BWchannel | | | | Config 1, 2 | MHz | 40: NRB,c = 106 | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | | Config 1, 2 |  | DLBWP.0.1 | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config 1, 2 |  | DLBWP.1.1 | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1, 2 |  | ULBWP.0.1 | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1, 2 |  | ULBWP.1.1 | ULBWP.1.1 |  |
| TDD configuration | | | | Config 1, 2 |  | TDDConf.1.1 CCA | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | | | Config 1, 2 |  | CR.1.1 CCA | CR.1.1 CCA |  |
| SSB Configuration | | | | Config 1, 2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | | | Config 1, 2 |  | DBT.1 | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1, 2 |  | 30 KHz | 30 KHz |  |
| PRACH Configuration | | | | Config 1, 2 |  | Table A.3.8.2.2-1 | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 | 1 |  |
| OCNG parameters | | | | |  | OP.1 | OP.1 |  |
| CP length | | | | |  | Normal | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low | 2x2 Low |  |
| Beam failure | | DCI format | | |  | 1-0 | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols | | |  | 2 | 2 |  |
|  | | Aggregation level | | | CCE | 8 | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 0 | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 0 | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size | REG bundle size |  |
|  | | REG bundle size | | |  | 6 | 6 |  |
| DRX | | | | |  | OFF | OFF |  |
| Gap pattern ID | | | | |  | gp0 | gp0 |  |
| gapOffset | | | | |  | 0 | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2 | | | | dBm/SCS kHz | -95 | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | | | |  | db0 | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | | |  | pbfd4 | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | | Config 1, 2 | |  | CSI-RS.2.1 TDD | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | | Config 1, 2 | |  | TRS.1.2 TDD | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | | | |  | 0,1 | 0,1 |  |
| T310 timer | | | | | ms | [1000] | [1000] |  |
| N310 | | | | |  | [2] | [2] |  |
| T1 | | | | | s | [0.2] | [0.2] | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | [0.85] | [0.93] |  |
| T3 | | | | | s | [0.44] | [0.52] |  |
| T4 | | | | | s | [0] | [0] |  |
| T5 | | | | | s | [0.45] | [0.45] |  |
| D1 | | | | | s | [0.41] | [0.41] |  |
| 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.10.3.4.1.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | | | |
|  | | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| DL CCA probability PCCA,DL | Note 10, 12 | |  | TBD | TBD | TBD | TBD | TBD |
|  | Note 11, 12 | |  | TBD | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA,UL | | |  | TBD | TBD | TBD | TBD | TBD |
| 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\_SSB of set q0 | | Config 1, 2 | dB | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | | Config 1, 2 | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | | Config 1, 2 | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | | Config 1, 2 | dBm/15 KHz | -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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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 transmitted SSS REs during DBT window.  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.3.6A].  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

**Table A.10.3.4.1.1-4: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 2** | | | | |
|  | | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| DL CCA probability PCCA.DL | | Note 10, 12 |  | TBD | TBD | TBD | TBD | TBD |
|  | | Note 11, 12 |  | TBD | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA.UL | | |  | TBD | TBD | TBD | TBD | TBD |
| 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\_SSB of set q0 | Config 1, 2 | | dB | 5 | [-1] | [-7] | [-7] | [-7] |
| SNR\_SSB of set q1 | Config 1, 2 | | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1, 2 | | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | Config 1, 2 | | dBm/15 KHz | -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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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 transmitted SSS REs during DBT window.  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.3.6A].  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

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**Figure A.10.3.4.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

A.10.3.4.1.2 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 initiate 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 = [410] 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.

In Test 1, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot < -7 dB.

In Test 2, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot ≥ -7 dB.

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.10.3.4.2 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in DRX mode

A.10.3.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate 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 SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5A.

The test parameters are given in Tables A.10.3.4.2.1-1, A.10.3.4.2.1-2, A.4.5.5.2.1-3 and A.10.3.4.2.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.10.3.4.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q0 in the active PSCell to emulate SSB based beam failure. Figure A.10.3.4.2.1-1 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 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA model. 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.10.3.4.2.1-1: Supported test configurations for FR1 PSCell with CCA**

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

**Table A.10.3.4.2.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Value** |  | **Comment** |
|  | | | | |  | **Test 1** | **Test 2** |  |
| Active E-UTRA PCell | | | | |  | Cell 1 | Cell 1 |  |
| E-UTRA RF Channel Number | | | | |  | 1 | 1 |  |
| Active PSCell | | | | |  | Cell 2 | Cell 2 |  |
| RF Channel Number | | | | |  | 2 | 2 |  |
| DL CCA model | | | | |  | As specifieed in A.3.20.2.1 | As specifieed in A.3.20.2.1 |  |
| UL CCA model | | | | |  | As specified in A.3.20.2.2 | As specified in A.3.20.2.2 |  |
| Duplex mode | | | | Config 1, 2 |  | TDD | TDD |  |
| BWchannel | | | | Config 1, 2 | MHz | 40: NRB,c = 106 | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | | Config 1, 2 |  | DLBWP.0.1 | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config 1, 2 |  | DLBWP.1.1 | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1, 2 |  | ULBWP.0.1 | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1, 2 |  | ULBWP.1.1 | ULBWP.1.1 |  |
| TDD configuration | | | | Config 1, 2 |  | TDDConf.1.1 CCA | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | | | Config 1, 2 |  | CR.1.1 CCA | CR.1.1 CCA |  |
| SSB Configuration | | | | Config 1, 2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | | | Config 1, 2 |  | DBT.1 | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1, 2 |  | 30 KHz | 30 KHz |  |
| PRACH Configuration | | | | Config 1, 2 |  | Table A.3.8.2.2-1 | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 | 1 |  |
| OCNG parameters | | | | |  | OP.1 | OP.1 |  |
| CP length | | | | |  | Normal | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low | 2x2 Low |  |
| Beam failure | | DCI format | | |  | 1-0 | 1-0 |  |
| detection transmission parameters | | Number of Control OFDM symbols | | |  | 2 | 2 |  |
|  | | Aggregation level | | | CCE | 8 | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 0 | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 0 | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size | REG bundle size |  |
|  | | REG bundle size | | |  | 6 | 6 |  |
| DRX | | | | |  | DRX.7 | DRX.7 | A.3.3.7 |
| Gap pattern ID | | | | |  | N.A. | N.A. |  |
| gapOffset | | | | |  | 0 | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1, 2 | | | | dBm/SCS kHz | -95 | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | | | |  | db0 | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | | |  | pbfd4 | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | | Config 1, 2 | |  | CSI-RS.2.1 TDD | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | | Config 1, 2 | |  | TRS.1.2 TDD | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | | | |  | 0,1 | 0,1 |  |
| T310 timer | | | | | ms | [1000] | [1000] |  |
| N310 | | | | |  | [2] | [2] |  |
| T1 | | | | | s | [1] | [1] | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | [8.37] | [9.01] |  |
| T3 | | | | | s | [4.52] | [5.16] |  |
| T4 | | | | | s | [0] | [0] |  |
| T5 | | | | | s | [3.89] | [3.39] |  |
| D1 | | | | | s | [3.85] | [3.85] |  |
| 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.10.3.4.2.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | | | |
|  | | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| DL CCA probability PCCA,DL | Note 10, 12 | |  | TBD | TBD | TBD | TBD | TBD |
|  | Note 11, 12 | |  | TBD | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA,UL | | |  | TBD | TBD | TBD | TBD | TBD |
| 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\_SSB of set q0 | | Config 1, 2 | dB | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | | Config 1, 2 | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | | Config 1, 2 | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | | Config 1, 2 | dBm/15 KHz | -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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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 transmitted SSS REs during DBT window.  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.3.6A].  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

**Table A.10.3.4.2.1-4: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 2** | | | | |
|  | | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| DL CCA probability PCCA,DL | | Note 10, 12 |  | TBD | TBD | TBD | TBD | TBD |
|  | | Note 11, 12 |  | TBD | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA,UL | | |  | TBD | TBD | TBD | TBD | TBD |
| 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\_SSB of set q0 | Config 1, 2 | | dB | 5 | [-1] | [-7] | [-7] | [-7] |
| SNR\_SSB of set q1 | Config 1, 2 | | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1, 2 | | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | Config 1, 2 | | dBm/15 KHz | -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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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 transmitted SSS REs during DBT window.  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.3.6A].  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

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**Figure A.10.3.4.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode**

A.10.3.4.2.2 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 initiate 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 = [3850] 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.

In Test 1, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot < -7 dB.

In Test 2, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot ≥ -7 dB.

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.10.3.5 Active BWP switching

#### A.10.3.5.1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

##### A.10.3.5.1.1 Test Purpose and Environment

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

The supported test configurations are shown in Table A.10.3.5.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in A.10.3.5.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.10.3.5.1.1-2. SRS configuration used in the test is specified in Table A.10.3.5.1.1-4.

The UE shall be configured with PRACH configuration on UL BWP on which the UE shall switch after the consistent UL LBT failure detection.

Before the test starts,

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

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

During T1,

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

During T2,

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

Table A.10.3.5.1.1-1: Supported test configurations for UL BWP switch test in EN-DC

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

Table A.10.3.5.1.1-2: General test parameters for UL BWP switch in 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 |  |
| *lbt-FailureDetectionTimer* [2] | ms | 80 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [1] |
| *lbt-FailureInstanceMaxCount* [2] |  | 4 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [1] |
| T1 | s | 0.1 | During T1 consistent LBT failure is detected on active UL BWP-1 |
| T2 | s | 0.1 | During T2 UE sends PRACH on active UL BWP-2 |

Table A.10.3.5.1.1-3: NR Cell specific test parameters for UL BWP switch test in EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | |
| T1 | T2 |
| TDD configuration | Config 1, 2 |  | TBD | |
| BWchannel | Config 1, 2 |  | 40 MHz: NRB,c = 106 | |
| DL CCA model | Config 1, 2 |  | As specified in clause A.3.20.2.1 | |
| UL CCA model | Config 1, 2 |  | As specified in clause A.3.20.2.2 | |
| Active BWP ID | Config 1, 2 |  | 1, 2 | |
| Initial DL BWP Configuration | Config 1, 2 |  | DLBWP.0.2 Note 4 | |
| Active DL BWP-1 Configuration | Config 1, 2 |  | DLBWP.1.1 Note 4 | |
| Active DL BWP-2 Configuration | Config 1, 2 |  | DLBWP.1.3 Note 4 | |
| Initial UL BWP Configuration | Config 1, 2 |  | ULBWP.0.2 Note 4 | |
| Active UL BWP-1 Configuration | Config 1, 2 |  | ULBWP.1.1 Note 4 | |
| Active UL BWP-2 Configuration | Config 1, 2 |  | ULBWP.1.3 Note 4 | |
| PDSCH Reference measurement channel | Config 1, 2 |  | TBD | |
| RMSI CORESET parameters | Config 1, 2 |  | TBD | |
| Dedicated CORESET parameters | Config 1, 2 |  | TBD | |
| OCNG Patterns | Config 1, 2 |  | OP.1 | |
| SSB Configuration | Config 1, 2 |  | TBD | |
| SMTC Configuration | Config 1, 2 |  | TBD | |
| Correlation Matrix and Antenna Configuration | Config 1, 2 |  | 1x2 Low | |
| TRS Configuration | Config 1, 2 |  | TBD | |
| DL CCA probability PCCA | Config 1, 2 |  | TBD | TBD |
| UL CCA probability PCCA | Config 1, 2 |  | TBD | TBD |
| PRACH configuration | Config 1, 2 |  | N/A | Configuration #1 in Table A.3.8.2.1-1 |
| EPRE ratio of PSS to SSS | | dB | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  | |
| NocNote 2 | Config 1, 2 | dBm/SCS | -101 | |
| SS-RSRP Note 3 | Config 1, 2 | dBm/SCS | -84 | |
| Ês/Iot | Config 1, 2 | dB | 17 | |
| Ês/Noc | Config 1, 2 | dB | 17 | |
| IoNote3 | Config 1, 2 | dBm/  38.16MHz | -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]. | | | | |

Table A.10.3.5.1.1-4: Sounding Reference Symbol Configuration for UL BWP Switch Test in EN-DC

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

##### A.10.3.5.1.2 Test Requirements

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

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

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

NOTE: The above delay is calculated as follows:’

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

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

Where:

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

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

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

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

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

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

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

A.10.3.5.2.1.1 Test Purpose and Environment

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

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

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

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

Before the test starts,

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

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

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

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

All cells have constant signal levels throughout the test.

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

During T1,

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

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

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

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

During T3,

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

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

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

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

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

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 |
| Frequency Range | | |  | FR1 |
| Duplex mode | | Config 1,2 |  | TDD |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | | Config 1,2 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | |  | 1, 2 |
| Initial DL BWP Configuration | | Config 1,2 |  | DLBWP.0.2 Note 4 |
| Active DL BWP-1 Configuration | | Config 1,2 |  | DLBWP.1.1 Note 4 |
| Active DL BWP-2 Configuration | | Config 1,2 |  | DLBWP.1.3 Note 4 |
| Initial UL BWP Configuration | | Config 1,2 |  | ULBWP.0.2 Note 4 |
| Active UL BWP-1 Configuration | | Config 1,2 |  | ULBWP.1.1 Note 4 |
| Active UL BWP-2 Configuration | | Config 1,2 |  | ULBWP.1.3 Note 4 |
| PDSCH Reference measurement channel | | Config 1,2 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | Config 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | Config 1,2 |  | CCR.1.1 CCA |
| OCNG Patterns | | Config 1,2 |  | OP.1 |
| SSB Configuration | Semi- static channel acces | Config 1,2 |  | SSB.1 CCA |
| Dymamic channel acces | Config 1,2 |  | SSB.2 CCA |
| SMTC Configuration | | Config 1,2 |  | SMTC.1 |
| TRS Configuration | | Config 1,2 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | Config 1,2 |  | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1,2 |  | 1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 Low |
| EPRE ratio of PSS to SSS | | |  |  |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |
| NocNote 2 | | Config 1,2 | dBm/SCS | [-101] |
| SS-RSRP Note 3 | | Config 1,2 | dBm/SCS | [-84] |
| Ês/Iot | | Config 1,2 | dB | 17 |
| Ês/Noc | | Config 1,2 | dB | 17 |
| IoNote3 | | Config 1,2 | dBm/38.16MHz | [-59] |
| Propagation Condition | | |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | |

A.10.3.5.2.1.2 Test Requirements

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

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

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

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

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

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

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

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

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

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

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

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

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

A.10.3.5.2.2.1 Test Purpose and Environment

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

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

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

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

Before the test starts,

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

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

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

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

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

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

All cells have constant signal levels throughout the test.

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

During T1,

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

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

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

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

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

During T3,

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

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

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

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

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

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

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

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

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

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | Cell 3 |
| Frequency Range | | |  | FR1 | |
| Duplex mode | | Config 1,2 |  | TDD | |
| TDD configuration | | Config 1,2 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1,2 |  | 40 MHz: NRB,c = 106 | |
| Active BWP ID | | |  | 1, 2 | 0 |
| Initial BWP Configuration | | Config 1,2 |  | DLBWP.0.2 | DLBWP.0.2 |
| Active BWP-0 Configuration | | Config 1,2 |  | NA | DLBWP.0.2 |
| Active BWP-1 Configuration | | Config 1,2 |  | DLBWP.1.3 | NA |
| Active BWP-2 Configuration | | Config 1,2 |  | DLBWP.1.1 | NA |
| PDSCH Reference measurement channel | | Config 1,2 |  | SR.1.1 CCA | |
| RMSI CORESET parameters | | Config 1,2 |  | CR.1.1 CCA | |
| Dedicated CORESET parameters | | Config 1,2 |  | CCR.1.1 CCA | |
| OCNG Patterns | | Config 1,2 |  | OP.1 | |
| SSB Configuration | Semi- static channel acces | Config 1,2 |  | SSB.1 CCA | |
| Dymamic channel acces | Config 1,2 |  | SSB.2 CCA | |
| SMTC Configuration | | Config 1,2 |  | SMTC.1 | |
| TRS Configuration | | Config 1,2 |  | TRS.1.2 TDD | |
| DL CCA probability (PCCA\_DL) | | Config 1,2 |  | 1 | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1,2 |  | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 | |
| Propagation Condition | | |  | AWGN | |
| EPRE ratio of PSS to SSS | | |  |  |  |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS Note 1 | | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | | |  |  |  |
| NocNote 2 | | Config 1,2 | dBm/SCS kHz | [-101] | [-101] |
| SS-RSRP Note 3 | | Config 1,2 | dBm/SCS kHz | [-84] | [-84] |
| Ês/Iot | | Config 1,2 | dB | 17 | 17 |
| Ês/Noc | | Config 1,2 | dB | 17 | 17 |
| IoNote3 | | Config 1,2 | dBm/38.16MHz | [-59] | [-59] |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | | |

A.10.3.5.2.2.2 Test Requirements

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

A.10.3.5.3.1.1 Test Purpose and Environment

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

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

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

Before the test starts,

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

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

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

All cells have constant signal levels throughout the test.

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

During T1,

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

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

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

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

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

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

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

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 2 |
| Frequency Range | | | |  | FR1 |
| Duplex mode | | | Config 1,2 |  | TDD |
| TDD configuration | | | Config 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | | | Config 1,2 |  | 40 MHz: NRB,c = 106 |
| Active DL BWP ID | | | |  | 1, 2 |
| Initial DL BWP Configuration | | | Config 1,2 |  | DLBWP.0.2 |
| Initial UL BWP Configuration | | | Config 1,2 |  | ULBWP.0.2 |
| Initial Condition | | Active DL BWP-1 Configuration | Config 1,2 |  | DLBWP.1.3 |
| Final Condition | | Active DL BWP-1 Configuration | Config 1,2 |  | DLBWP.1.1 |
| Initial UL BWP Configuration | | | Config 1,2 |  | ULBWP.0.2 |
| Active UL BWP-1 Configuration | | | Config 1,2 |  | ULBWP.1.3 |
| Active UL BWP-2 Configuration | | | Config 1,2 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | | Config 1,2 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | | Config 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | | Config 1,2 |  | CCR.1.1 CCA |
| OCNG Patterns | | | Config 1,2 |  | OP.1 |
| SSB Configuration | Semi- static channel acces | | Config 1,2 |  | SSB.1 CCA |
| Dymamic channel acces | | Config 1,2 |  | SSB.2 CCA |
| SMTC Configuration | | | Config 1,2 |  | SMTC.1 |
| TRS Configuration | | | Config 1,2 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | | Config 1,2 |  | 1 |
| UL CCA probability (PCCA\_UL) | | | Config 1,2 |  | 1 |
| Antenna Configuration | | | |  | 1x2 |
| Propagation Condition | | | |  | AWGN |
| EPRE ratio of PSS to SSS | | | |  |  |
| EPRE ratio of PBCH DMRS to SSS | | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |  |  |
| NocNote 2 | | | Config 1,2 | dBm/SCS kHz | [-101] |
| SS-RSRP Note 3 | | | Config 1,2 | dBm/SCS kHz | [-84] |
| Ês/Iot | | | Config 1,2 | dB | 17 |
| Ês/Noc | | | Config 1,2 | dB | 17 |
| IoNote3 | | | Config 1,2 | dBm/38.16MHz | [-59] |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | | |

A.10.3.5.3.1.2 Test Requirements

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

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

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

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

### A.10.3.6 PSCell addition and release delay

#### A.10.3.6.1 Addition and Release Delay of known NR PSCell on the carrier under CCA

##### A.10.3.6.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays on the carrier under CCA under EN-DC are within the requirements stated in clause 7.31A.2 [15] for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.10.3.6.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.10.3.6.1.1-2 and cell-specific parameters in A.10.3.6.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event 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.10.3.6.1.1-1: Supported test configurations for FR1 PSCell

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

Table A.10.3.6.1.1-2: General Test Parameters for PSCell Addition and Release

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell on the carrier under CCA |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
|  | Neighbour cell |  | Cell2 | Neighbour cell on RF channel number 2. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour Cell |  | Cell2 | PSCell released on RF channel number 2. |
| B1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event B1. |
|  | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event B1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
|  | Time to Trigger | S | 0 |  |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| DL CCA model | |  |  | As specified in clause A.3.20.2.1 |
| UL CCA model | |  |  | As specified in clause A.3.20.2.2 |
| Measurement gap pattern Id | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration on cell2 | |  | FR1 PRACH configuration 2 | Captured in A.3.8.2.1 |
| CQI/PMI periodicity and offset configuration index on cell2 | |  | 2ms | CQI reporting for PSCell every uplink subframe |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 1 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | ≥ Tidentify\_irat\_cca\_without\_index | Tidentify\_irat\_cca\_without\_index is defined in clause 8.1.2.4.21A and 8.1.2.4.22A in TS 36.133  During this time the UE shall identify neighbour cell (cell2) and report event B1. |
| T3 | | s | ≥ Tconfig\_PSCell\_withCCA | During this time the UE adds the PSCell. Tconfig\_PSCell\_withCCA  is defined in clause 7.31A.2 |
| T4 | | s | 0.5 | During this time the UE sends CSI reports for PSCell. |
| T5 | | s | 0.5 | During this time the UE releases the PSCell. |

Table A.10.3.6.1.1-3: Cell Specific Parameters for PSCell Addition and Release

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | | | |
|  |  |  | T1 | T2 | T3 | T4 | T5 |
| PCCA\_DL |  |  | [TBD] | [TBD] | [TBD] | [TBD] | [TBD] |
| PCCA\_UL |  |  | [TBD] | [TBD] | [TBD] | [TBD] | [TBD] |
| E-UTRA RF Channel Number |  | 1,2 | 1 | | | | |
| NR RF Channel Number |  | 1,2 | 2 | | | | |
| TDD configuration |  | 1,2 | TDDConf.1.1 CCA | | | | |
| BWchannel |  | 1,2 | 40: NRB,c = 106 | | | | |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | | | | |
| PDSCH Reference |  | 1,2 | SR1.1 CCA | | | | |
| RMSI CORESET Reference |  | 1,2 | CR1.1 CCA | | | | |
| Dedicated CORESET Reference |  | 1,2 | CR1.1 CCA | | | | |
| OCNG Patterns |  | 1,2 | OP.1 | | | | |
| DBT window configuration |  | 1, 2 | DBT.1 | | | | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | | | | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | | | | |
| SMTC configuration |  | 1,2 | SMTC.1 | | | | |
| TRS Configuration |  | 1,2 | TRS.1.2 TDD | | | | |
| EPRE ratio of PSS to SSS |  |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | | | | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | dB | 1,2 | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | | | | |
| Note2 | dBm/15 kHz | 1,2 | N/A | -85 | | | |
| Note2 | dBm/SCS | 1,2 | N/A | -82 | | | |
|  |  | 1,2 | -infinity | 0 | | | |
|  |  | 1,2 | -infinity | 0 | | | |
| SS-RSRPNote3 | dBm/SCS | 1,2 | -infinity | -82 | | | |
| IoNote3 | dBm/38.1MHz | 1,2 | N/A | -51 | | | |
| Propagation condition |  | 1,2 | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

##### A.10.3.6.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest Tconfig\_PSCell\_withCCA Note1 into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest 20 ms into T5.

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

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31A.2 [15]:

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

Where:

TRRC\_delay = 20 ms

Tprocessing = 20 ms

Tsearch\_withCCA = 0

T∆\_withCCA = (1+ L2)\*20 ms

L2 is the number of SMTC occasions not available at the UE for fine time tracking and acquiring full timing information. TPSCell\_ DU\_withCCA = TPSCell\_ DU  + ΔPRACH  as defined in 7.31A.2 TS36.133.

### A.10.3.7 Active TCI state switching delay

## A.10.4 Measurement procedure

### A.10.4.1 Intra-frequency measurements

#### A.10.4.1.1 Event-triggered reporting tests on PSCC without gaps under non-DRX

##### A.10.4.1.1.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.10.4.1.1.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and two cells on the same carrier frequency with CCA transmitting SSBs in DBT windows according to DL CCA model: PSCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.10.4.1.1.2-1 and A.10.4.1.1.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 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 Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

* In the first test (Test 1), the UE is configured with SS-RSRP as Event A3 measurement quantity.
* In the second test (Test 2), the UE is configured with SS-RSRQ as Event A3 measurement quantity.
* In the third test (Test 3), the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.10.4.1.1.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Table A.10.4.1.1.2-2: General test parameters for intra-frequency event triggered reporting without gaps

Editor’s note: Table TBD

Table A.10.4.1.1.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gaps

Editor’s note: Table TBD

##### A.10.4.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.1.2 Event-triggered reporting tests on PSCC without gaps under DRX

##### A.10.4.1.2.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.10.4.1.2.2 Test parameters

##### A.10.4.1.2.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.1.3 Event-triggered reporting tests on PSCC with per-UE gaps under non-DRX

##### A.10.4.1.3.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.10.4.1.3.2 Test parameters

##### A.10.4.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.1.4 Event-triggered reporting tests on PSCC with per-UE gaps under DRX

##### A.10.4.1.4.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.10.4.1.4.2 Test parameters

##### A.10.4.1.4.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.1.5 Event-triggered reporting tests on SCC without gaps under non-DRX

##### A.10.4.1.5.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.10.4.1.5.2 Test parameters

##### A.10.4.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.1.6 Event-triggered reporting tests on SCC without gaps under DRX

##### A.10.4.1.6.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.10.4.1.6.2 Test parameters

##### A.10.4.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.1.7 Event-triggered reporting tests on SCC with per-UE gaps under non-DRX

##### A.10.4.1.7.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.10.4.1.7.2 Test parameters

##### A.10.4.1.7.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.1.8 Event-triggered reporting tests on SCC with per-UE gaps under DRX

##### A.10.4.1.8.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.10.4.1.8.2 Test parameters

##### A.10.4.1.8.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.1.9 RSSI measurement reporting on PSCC

##### A.10.4.1.9.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

##### A.10.4.1.9.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.9.10.4.1.9.2-1. There are two cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.1.9.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.4.1.9.2-2: General test parameters.

Editor’s note: Table TBD

#### A.10.4.1.10 Channel occupancy measurement reporting on PSCC

##### A.10.4.1.10.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

##### A.10.4.1.10.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.1.10.2-1. There are two cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.1.10.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.4.1.10.2-2: General test parameters.

Editor’s note: Table is TBD

#### A.10.4.1.11 RSSI measurement reporting on SCC

##### A.10.4.1.11.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

##### A.10.4.1.11.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.9.10.4.1.11.2-1. There are three cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, Cell 3 is SCell on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1, Cell 2, and Cell 3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.1.11.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.4.1.11.2-2: General test parameters.

Editor’s note: Table TBD

#### A.10.4.1.12 Channel occupancy measurement reporting on SCC

##### A.10.4.1.12.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

##### A.10.4.1.12.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.1.12.2-1. There are three cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, and Cell 3 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1, Cell 2, Cell 3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.1.12.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.4.1.12.2-2: General test parameters.

Editor’s note: Table is TBD

### A.10.4.2 Inter-frequency measurements

#### A.10.4.2.1 RSSI measurement reporting

##### A.10.4.2.1.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the inter-frequency RSSI measurement reporting requirements in Section 9.3A.8.

##### A.10.4.2.1.2 Test parameters

In the test, the UE is configured to perform inter-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.2.1.2-1. There are two cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The RSSI measurement is performed on an inter-frequency under CCA. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.2.1.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.4.2.1.2-2: General test parameters.

Editor’s note: Table TBD

#### A.10.4.2.2 Channel occupancy measurement reporting

##### A.10.4.2.2.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the inter-frequency channel occupancy measurement reporting requirements in Section 9.3A.9.

##### A.10.4.2.2.2 Test parameters

In the test, the UE is configured to perform inter-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.2.2.2-1. There are two cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The channel occupancy measurement is performed on an inter-frequency under CCA. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.2.2.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.4.2.2.2-2: General test parameters.

Editor’s note: Table is TBD

#### A.10.4.2.3 EN-DC event triggered reporting tests for FR1 with CCA cell without SSB time index detection when DRX is not used

##### A.10.4.2.3.1 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 EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.3.1-1, A.10.4.2.3.1-2, and A.10.4.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.3.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.2.3.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.3.1-1.

Table A.10.4.2.3.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 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.10.4.2.3.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 with CCA is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1,2 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1,2 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2 | -6 | |  |
| Hysteresis | dB | Config 1,2 | 0 | |  |
| CP length |  | Config 1,2 | Normal | |  |
| TimeToTrigger | s | Config 1,2 | 0 | |  |
| Filter coefficient |  | Config 1,2 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | | Synchronous cells. |
| T1 | s | Config 1,2 | [5] | |  |
| T2 | s | Config 1,2 | [1] | [1] |  |

Table A.10.4.2.3.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | 2 | |
| Duplex mode | |  | Config 1,2 | TDD | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,2 | SR.1.1 CCA | | - | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | - | |
| SSB parameters | Semi-static channel access |  | Config 1,2 | SSB.1 CCA | | SSB.1 CCA | |
|  | Dynamic channel access |  | Config 1,2 | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | |  | Config 1,2 | As defined in A.3.21.1 | | As defined in A.3.21.1 | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | |  |  | TBD | | TBD | |
| UL CCA probability PCCA\_UL | |  |  | TBD | | TBD | |
| 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 | |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2 | [-101] | | [-101] | |
| Note2 | | dBm/SCS | Config 1,2 | [-101] | | [-101] | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91 | -91 | -Infinity | -88 |
|  | | dB | Config 1,2 | 4 | 4 | -Infinity | 7 |
|  | | dB | Config 1,2 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | |  | Config 1,2 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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.10.4.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.2.4 EN-DC event triggered reporting tests for FR1 cell with CCA without SSB time index detection when DRX is used

##### A.10.4.2.4.1 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 EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.4.1-1, A.10.4.2.4.1-2, and A.10.4.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.4.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.10.4.2.4.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.4.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.10.4.2.4.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 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.10.4.2.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 with CCA is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1,2 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2 | -6 | | | |  |
| Hysteresis | dB | Config 1,2 | 0 | | | |  |
| CP length |  | Config 1,2 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2 | 0 | | | |  |
| Filter coefficient |  | Config 1,2 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | | | | Synchronous cells. |
| T1 | s | Config 1,2 | [5] | | | |  |
| T2 | s | Config 1,2 | [1.1] | [11] | [1.1] | [11] |  |

Table A.10.4.2.4.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | | | Cell 3 | | | |
|  | |  | configuration | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | | | 2 | | | |
| Duplex mode | |  | Config 1,2 | TDD | | | | | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | | | TDDConf.1.1 CCA | | | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference | |  | Config 1,2 | SR.1.1 CCA | | | | - | | | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | | | - | | | |
| SSB parameters | Semi-static channel access |  | Config 1,2 | SSB.1 CCA | | | | SSB.1 CCA | | | |
|  | Dynamic channel access |  | Config 1,2 | SSB.2 CCA | | | | SSB.2 CCA | | | |
| DBT window configuration | |  | Config 1,2 | As defined in A.3.21.1 | | | | As defined in A.3.21.1 | | | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | |  |  | TBD | | | | TBD | | | |
| UL CCA probability PCCA\_UL | |  |  | TBD | | | | TBD | | | |
| 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 | |  | Config 1,2 | 0 | | | | 0 | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | | |
| Note2 | | dBm/15kHz | Config 1,2 | [-101] | | | | [-101] | | | |
| Note2 | | dBm/SCS | Config 1,2 | [-101] | | | | [-101] | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91 | | -91 | | -Infinity | | -88 | |
|  | | dB | Config 1,2 | 4 | | 4 | | -Infinity | | 7 | |
|  | | dB | Config 1,2 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | |  | Config 1,2 | AWGN | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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.10.4.2.4.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | Ms640 |  |
| shortDRX | disable | disable |  |

Table A.10.4.2.4.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.10.4.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.2.5 EN-DC event triggered reporting tests for FR1 cell with CCA with SSB time index detection when DRX is not used

##### A.10.4.2.5.1 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 EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.5.1-1, A.10.4.2.5.1-2, and A.10.4.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.5.1-1.

Table A.10.4.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 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.10.4.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 with CCA is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1,2 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1,2 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2 | -6 | |  |
| Hysteresis | dB | Config 1,2 | 0 | |  |
| CP length |  | Config 1,2 | Normal | |  |
| TimeToTrigger | s | Config 1,2 | 0 | |  |
| Filter coefficient |  | Config 1,2 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | | Synchronous cells. |
| T1 | s | Config 1,2 | [5] | |  |
| T2 | s | Config 1,2 | [1] | [1] |  |

Table A.10.4.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | 2 | |
| Duplex mode | |  | Config 1,2 | TDD | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | TDDConf.1.1 CCA | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference | |  | Config 1,2 | SR.1.1 CCA | | - | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | - | |
| SSB parameters | Semi-static channel access |  | Config 1,2 | SSB.1 CCA | | SSB.1 CCA | |
|  | Dynamic channel access |  | Config 1,2 | SSB.2 CCA | | SSB.2 CCA | |
| DBT window configuration | |  | Config 1,2 | As defined in A.3.21.1 | | As defined in A.3.21.1 | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | |  |  | TBD | | TBD | |
| UL CCA probability PCCA\_UL | |  |  | TBD | | TBD | |
| 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 | |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2 | [-101] | | [-101] | |
| Note2 | | dBm/SCS | Config 1,2 | [-101] | | [-101] | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91 | -91 | -Infinity | -88 |
|  | | dB | Config 1,2 | 4 | 4 | -Infinity | 7 |
|  | | dB | Config 1,2 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | |  | Config 1,2 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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.10.4.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.2.6 EN-DC event triggered reporting tests for FR1 cell with CCA with SSB time index detection when DRX is used

##### A.10.4.2.6.1 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 EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.6.1-1, A.10.4.2.6.1-2, and A.10.4.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.10.4.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.6.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.10.4.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | E-UTRAN cell: LTE FDD  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | E-UTRAN cell: LTE TDD  NR cell with CCA: 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.10.4.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cell |  | Config 1,2 | LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 with CCA is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1,2 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1,2 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2 | -6 | | | |  |
| Hysteresis | dB | Config 1,2 | 0 | | | |  |
| CP length |  | Config 1,2 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2 | 0 | | | |  |
| Filter coefficient |  | Config 1,2 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3 μs | | | | Synchronous cells. |
| T1 | s | Config 1,2 | [5] | | | |  |
| T2 | s | Config 1,2 | [1.1] | [11] | [1.1] | [11] |  |

Table A.10.4.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | | | Cell 3 | | | |
|  | |  | configuration | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | |  | Config 1,2 | 1 | | | | 2 | | | |
| Duplex mode | |  | Config 1,2 | TDD | | | | | | | |
| BWchannel | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | | | | |
| BWP BW | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | | | | |
| TDD configuration | |  | Config 1,2 | TDDConf.1.1 CCA | | | | TDDConf.1.1 CCA | | | |
| Initial DL BWP | |  | Config 1,2 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | Config 1,2 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | Config 1,2 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | Config 1,2 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | |  | Config 1,2 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference | |  | Config 1,2 | SR.1.1 CCA | | | | - | | | |
| CORESET Reference Channel | |  | Config 1,2 | CR.1.1 CCA | | | | - | | | |
| SSB parameters | Semi-static channel access |  | Config 1,2 | SSB.1 CCA | | | | SSB.1 CCA | | | |
|  | Dynamic channel access |  | Config 1,2 | SSB.2 CCA | | | | SSB.2 CCA | | | |
| DBT window configuration | |  | Config 1,2 | As defined in A.3.21.1 | | | | As defined in A.3.21.1 | | | |
| SMTC configuration | |  | Config 1,2 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH | | kHz | Config 1,2 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | |  |  | TBD | | | | TBD | | | |
| UL CCA probability PCCA\_UL | |  |  | TBD | | | | TBD | | | |
| 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 | |  | Config 1,2 | 0 | | | | 0 | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | | |
| Note2 | | dBm/15kHz | Config 1,2 | [-101] | | | | [-101] | | | |
| Note2 | | dBm/SCS | Config 1,2 | [-101] | | | | [-101] | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -91 | | -91 | | -Infinity | | -88 | |
|  | | dB | Config 1,2 | 4 | | 4 | | -Infinity | | 7 | |
|  | | dB | Config 1,2 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | dBm/38.16MHz | Config 1,2 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | |  | Config 1,2 | AWGN | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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.10.4.2.6.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | Ms640 |  |
| shortDRX | disable | disable |  |

Table A.10.4.2.6.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.10.4.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.2.7 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is not used

##### A.10.4.2.7.1 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 EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.7.1-1, A.10.4.2.7.1-2, and A.10.4.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.7.1-1.

Table A.10.4.2.7.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | E-UTRAN cell: LTE FDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 5 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode,  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod |
| 6 | E-UTRAN cell: LTE TDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 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.10.4.2.7.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 3 ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | [5] | |  |
| T2 | s | Config 1,2,3,4,5,6 | [1] | [1] |  |

Table A.10.4.2.7.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4 | TDD | | FDD | |
|  | |  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3,6 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3,6 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| TDD configuration | |  | Config 1,4 | TDDConf.1.1 CCA | | NA | |
|  | |  | Config 2,5 | TDDConf.1.1 CCA | | TDDConf.1.1 | |
|  | |  | Config 3,6 | TDDConf.1.1 CCA | | TDDConf.2.1 | |
| Initial DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2,3,4,5,6 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference  measurement channel | |  | Config 1,4 | SR.1.1 CCA | | SR.1.1 FDD | |
| Config 2,5 | SR.1.1 CCA | | SR.1.1 TDD | |
| Config 3,6 | SR.1.1 CCA | | SR.2.1 TDD | |
| CORESET Reference Channel | |  | Config 1,4 | CR.1.1 CCA | | CR.1.1 FDD | |
| Config 2,5 | CR.1.1 CCA | | CR.1.1 TDD | |
| Config 3,6 | CR.1.1 CCA | | CR.2.1 TDD | |
| SSB | Semi-static |  | Config 1,4 | SSB.1 CCA | | SSB.1 FR1 | |
| parameters | channel |  | Config 2,5 | SSB.1 CCA | | SSB.1 FR1 | |
|  | access |  | Config 3,6 | SSB.1 CCA | | SSB.2 FR1 | |
|  | Dynamic |  | Config 1,4 | SSB.2 CCA | | SSB.1 FR1 | |
|  | channel |  | Config 2,5 | SSB.2 CCA | | SSB.1 FR1 | |
|  | access |  | Config 3,6 | SSB.2 CCA | | SSB.2 FR1 | |
| DBT window configuration | |  | Config 1,2,3,4,5,6 | As defined in A.3.21.1 | | Not applicable | |
| SMTC configuration | |  | Config 1,4 | SMTC.2 | | SMTC.5 | |
| defined in A.3.11 | |  | Config 2,3,5,6 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2,4,5 | 30 | | 15 | |
| subcarrier spacing | |  | Config 3,6 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | |  | Config 1,2,3,4,5,6 | TBD | | TBD | |
| UL CCA probability PCCA\_UL | |  | Config 1,2,3,4,5,6 | TBD | | TBD | |
| 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 | |  | Config 1,2,3,4,5,6 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2,3,4,5,6 | [-104] | | -98 | |
| Note2 | | dBm/SCS | Config 1,2,4,5 | [-101] | | -98 | |
|  | | Config 3,6 | [-101] | | -95 | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2,4,5 | -94 | -94 | -Infinity | -91 |
|  | | Config 3,6 | -91 | -91 | -Infinity | -88 |
|  | | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
|  | | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | dBm/9.36MHz | NR Config 1,2,4,5 | -58.49 | -58.49 | -70.05 | -62.26 |
| dBm/38.16MHz | NR Config 3,6 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | |  | Config 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.10.4.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.2.8 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is used

##### A.10.4.2.8.1 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 EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.8.1-1, A.10.4.2.8.1-2, and A.10.4.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.10.4.2.8.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.8.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.10.4.2.8.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | E-UTRAN cell: LTE FDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 5 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode,  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod |
| 6 | E-UTRAN cell: LTE TDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 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.10.4.2.8.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 3 ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | [5] | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | [1.1] | [11] | [1.1] | [11] |  |

Table A.10.4.2.8.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | | | Cell 3 | | | |
|  | |  | configuration | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6 | 1 | | | | 2 | | | |
| Duplex mode | |  | Config 1,4 | TDD | | | | FDD | | | |
|  | |  | Config 2,3,5,6 | TDD | | | | TDD | | | |
| BWchannel | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3,6 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3,6 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,4 | TDDConf.1.1 CCA | | | | NA | | | |
|  | |  | Config 2,5 | TDDConf.1.1 CCA | | | | TDDConf.1.1 | | | |
|  | |  | Config 3,6 | TDDConf.1.1 CCA | | | | TDDConf.2.1 | | | |
| Initial DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | |  | Config 1,2,3,4,5,6 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4,5,6 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference  measurement channel | |  | Config 1,4 | SR.1.1 CCA | | | | SR.1.1 FDD | | | |
| Config 2,5 | SR.1.1 CCA | | | | SR.1.1 TDD | | | |
| Config 3,6 | SR.1.1 CCA | | | | SR.2.1 TDD | | | |
| CORESET Reference  Channel | |  | Config 1,4 | CR.1.1 CCA | | | | CR.1.1 FDD | | | |
| Config 2,5 | CR.1.1 CCA | | | | CR.1.1 TDD | | | |
| Config 3,6 | CR.1.1 CCA | | | | CR.2.1 TDD | | | |
| SSB | Semi-static |  | Config 1,4 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
| parameters | channel |  | Config 2,5 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
|  | access |  | Config 3,6 | SSB.1 CCA | | | | SSB.2 FR1 | | | |
|  | Dynamic |  | Config 1,4 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  | channel |  | Config 2,5 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  | access |  | Config 3,6 | SSB.2 CCA | | | | SSB.2 FR1 | | | |
| DBT window configuration | |  | Config 1,2,3,4,5,6 | As defined in A.3.21.1 | | | | Not applicable | | | |
| SMTC configuration | |  | Config 1,4 | SMTC.2 | | | | SMTC.5 | | | |
| defined in A.3.11 | |  | Config 2,3,5,6 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH | | kHz | Config 1,2,4,5 | 30 | | | | 15 | | | |
| subcarrier spacing | |  | Config 3,6 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | |  | Config 1,2,3,4,5,6 | TBD | | | | TBD | | | |
| UL CCA probability PCCA\_UL | |  | Config 1,2,3,4,5,6 | TBD | | | | TBD | | | |
| 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 | |  | Config 1,2,3,4,5,6 | 0 | | | | 0 | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | | |
| Note2 | | dBm/15kHz | Config 1,2,3,4,5,6 | [-104] | | | | -98 | | | |
| Note2 | | dBm/SCS | Config 1,2,4,5 | [-101] | | | | -98 | | | |
|  | | Config 3,6 | [-101] | | | | -95 | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2,4,5 | -94 | | -94 | | -Infinity | | -91 | |
|  | | Config 3,6 | -91 | | -91 | | -Infinity | | -88 | |
|  | | dB | Config 1,2,3,4,5,6 | 4 | | 4 | | -Infinity | | 7 | |
|  | | dB | Config 1,2,3,4,5,6 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | dBm/9.36MHz | NR Config 1,2,4,5 | -58.49 | | -58.49 | | -70.05 | | -62.26 | |
| dBm/38.16MHz | NR Config 3,6 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | |  | Config 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.10.4.2.8.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | Ms640 |  |
| shortDRX | disable | disable |  |

Table A.10.4.2.8.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.10.4.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.2.9 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used

##### A.10.4.2.9.1 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 EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.9.1-1, A.10.4.2.9.1-2, and A.10.4.2.9.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.9.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.2.9.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.9.1-1.

Table A.10.4.2.9.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | E-UTRAN cell: LTE FDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 5 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode,  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod |
| 6 | E-UTRAN cell: LTE TDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 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.10.4.2.9.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | Comment |
|  |  | configuration | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | OFF | | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 3 ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 1,2,3,4,5,6 | 3 μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | [5] | |  |
| T2 | s | Config 1,2,3,4,5,6 | [1] | [1] |  |

Table A.10.4.2.9.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | Cell 3 | |
|  | |  | configuration | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4 | TDD | | FDD | |
|  | |  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3,6 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3,6 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| TDD configuration | |  | Config 1,4 | TDDConf.1.1 CCA | | NA | |
|  | |  | Config 2,5 | TDDConf.1.1 CCA | | TDDConf.1.1 | |
|  | |  | Config 3,6 | TDDConf.1.1 CCA | | TDDConf.2.1 | |
| Initial DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1,2,3,4,5,6 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4,5,6 | OP.1 | | OP.1 | |
| PDSCH Reference  measurement channel | |  | Config 1,4 | SR.1.1 CCA | | SR.1.1 FDD | |
| Config 2,5 | SR.1.1 CCA | | SR.1.1 TDD | |
| Config 3,6 | SR.1.1 CCA | | SR.2.1 TDD | |
| CORESET Reference  Channel | |  | Config 1,4 | CR.1.1 CCA | | CR.1.1 FDD | |
| Config 2,5 | CR.1.1 CCA | | CR.1.1 TDD | |
| Config 3,6 | CR.1.1 CCA | | CR.2.1 TDD | |
| SSB | Semi-static |  | Config 1,4 | SSB.1 CCA | | SSB.1 FR1 | |
| parameters | channel |  | Config 2,5 | SSB.1 CCA | | SSB.1 FR1 | |
|  | Access |  | Config 3,6 | SSB.1 CCA | | SSB.2 FR1 | |
|  | Dynamic |  | Config 1,4 | SSB.2 CCA | | SSB.1 FR1 | |
|  | channel |  | Config 2,5 | SSB.2 CCA | | SSB.1 FR1 | |
|  | Access |  | Config 3,6 | SSB.2 CCA | | SSB.2 FR1 | |
| DBT window configuration | |  | Config 1,2,3,4,5,6 | As defined in A.3.21.1 | | Not applicable | |
| SMTC configuration | |  | Config 1,4 | SMTC.2 | | SMTC.5 | |
| defined in A.3.11 | |  | Config 2,3,5,6 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH | | kHz | Config 1,2,4,5 | 30 | | 15 | |
| subcarrier spacing | |  | Config 3,6 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | |  | Config 1,2,3,4,5,6 | TBD | | TBD | |
| UL CCA probability PCCA\_UL | |  | Config 1,2,3,4,5,6 | TBD | | TBD | |
| 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 | |  | Config 1,2,3,4,5,6 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz | Config 1,2,3,4,5,6 | [-104] | | -98 | |
| Note2 | | dBm/SCS | Config 1,2,4,5 | [-101] | | -98 | |
|  | | Config 3,6 | [-101] | | -95 | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2,4,5 | -94 | -94 | -Infinity | -91 |
|  | | Config 3,6 | -91 | -91 | -Infinity | -88 |
|  | | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
|  | | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | dBm/9.36MHz | NR Config 1,2,4,5 | -58.49 | -58.49 | -70.05 | -62.26 |
| dBm/38.16MHz | NR Config 3,6 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | |  | Config 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.10.4.2.9.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.2.10 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is used

##### A.10.4.2.10.1 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 EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.10.1-1, A.10.4.2.10.1-2, and A.10.4.2.10.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.10.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.10.4.2.10.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.10.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.10.4.2.10.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | E-UTRAN cell: LTE FDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | E-UTRAN cell: LTE FDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 5 | E-UTRAN cell: LTE TDD  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode,  NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod |
| 6 | E-UTRAN cell: LTE TDD  NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell with CCA: 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.10.4.2.10.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | | | | Comment |
|  |  | configuration | Test 1 | Test 2 | Test 3 | Test 4 |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | | | One E-UTRAN TDD carrier frequency is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR cell 2 (PScell) | | | | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3,4,5,6 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2,3,4,5,6 | 3 ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 1,2,3,4,5,6 | 3 μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | [5] | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | [1.1] | [11] | [1.1] | [11] |  |

Table A.10.4.2.10.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test | Cell 2 | | | | Cell 3 | | | |
|  | |  | configuration | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6 | 1 | | | | 2 | | | |
| Duplex mode | |  | Config 1,4 | TDD | | | | FDD | | | |
|  | |  | Config 2,3,5,6 | TDD | | | | TDD | | | |
| BWchannel | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3,6 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2,4,5 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3,6 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| TDD configuration | |  | Config 1,4 | TDDConf.1.1 CCA | | | | NA | | | |
|  | |  | Config 2,5 | TDDConf.1.1 CCA | | | | TDDConf.1.1 | | | |
|  | |  | Config 3,6 | TDDConf.1.1 CCA | | | | TDDConf.2.1 | | | |
| Initial DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | |  | Config 1,2,3,4,5,6 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3,4,5,6 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference  measurement channel | |  | Config 1,4 | SR.1.1 CCA | | | | SR.1.1 FDD | | | |
| Config 2,5 | SR.1.1 CCA | | | | SR.1.1 TDD | | | |
| Config 3,6 | SR.1.1 CCA | | | | SR.2.1 TDD | | | |
| CORESET Reference  Channel | |  | Config 1,4 | CR.1.1 CCA | | | | CR.1.1 FDD | | | |
| Config 2,5 | CR.1.1 CCA | | | | CR.1.1 TDD | | | |
| Config 3,6 | CR.1.1 CCA | | | | CR.2.1 TDD | | | |
| SSB | Semi-static |  | Config 1,7 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
| parameters | channel |  | Config 4,10 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
|  | access |  | Config 2,8 | SSB.1 CCA | | | | SSB.2 FR1 | | | |
|  | Dynamic |  | Config 1,7 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  | channel |  | Config 4,10 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  | access |  | Config 2,8 | SSB.2 CCA | | | | SSB.2 FR1 | | | |
| DBT window configuration | |  | Config 1,2,3,4,5,6 | As defined in A.3.21.1 | | | | Not applicable | | | |
| SMTC configuration | |  | Config 1,4 | SMTC.2 | | | | SMTC.5 | | | |
| defined in A.3.11 | |  | Config 2,3,5,6 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH | | kHz | Config 1,2,4,5 | 30 | | | | 15 | | | |
| subcarrier spacing | |  | Config 3,6 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | |  | Config 1,2,3,4,5,6 | TBD | | | | TBD | | | |
| UL CCA probability PCCA\_UL | |  | Config 1,2,3,4,5,6 | TBD | | | | TBD | | | |
| 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 | |  | Config 1,2,3,4,5,6 | 0 | | | | 0 | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | | | |  | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | | | |  | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | | | |  | | | |
| Note2 | | dBm/15kHz | Config 1,2,3,4,5,6 | [-104] | | | | -98 | | | |
| Note2 | | dBm/SCS | Config 1,2,4,5 | [-101] | | | | -98 | | | |
|  | | Config 3,6 | [-101] | | | | -95 | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2,4,5 | -94 | | -94 | | -Infinity | | -91 | |
|  | | Config 3,6 | -91 | | -91 | | -Infinity | | -88 | |
|  | | dB | Config 1,2,3,4,5,6 | 4 | | 4 | | -Infinity | | 7 | |
|  | | dB | Config 1,2,3,4,5,6 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | dBm/9.36MHz | NR Config 1,2,4,5 | -58.49 | | -58.49 | | -70.05 | | -62.26 | |
| dBm/38.16MHz | NR Config 3,6 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | |  | Config 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.10.4.2.10.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
|  | Value | Value |  |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |  |
| drx-RetransmissionTimerDL | sl1 | sl1 |  |
| drx-RetransmissionTimerUL | sl1 | sl1 |  |
| drx-LongCycleStartOffset | ms40 | Ms640 |  |
| shortDRX | disable | disable |  |

Table A.10.4.2.10.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.10.4.2.10.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

### A.10.4.3 L1-RSRP measurements for beam reporting

#### A.10.4.3.1 SSB based L1-RSRP measurement on PSCC when DRX is not used

##### A.10.4.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.1.1-1.

Table A.10.4.3.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD  With CCA: 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 | |

##### A.10.4.3.1.2 Test parameters

There are two cells in the test, E-UTRAN Pcell (Cell 1) and FR1 PSCell (Cell 2) which operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 are given in Table A.10.4.3.1.2-1 and Table A.10.4.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.1.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1,2 |  | freq1 |
| DL CCA model | 1,2 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1,2 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | Off |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| EPRE ratio of PSS to SSS |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2 | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1,2 |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.10.4.3.1.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1,2 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1,2 |  | TBD | TBD | TBD | TBD |
| Note2 | 1,2 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2 | dBm/SSB SCS | -91.65 | | | |
|  | 1,2 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1,2 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS Res when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.10.4.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.3.2 SSB based L1-RSRP measurement on PSCC when DRX is used

##### A.10.4.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.1.1-1.

Table A.10.4.3.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD  With CCA: 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 | |

##### A.10.4.3.2.2 Test parameters

There are two cells in the test, E-UTRAN Pcell (Cell 1) and FR1 PSCell (Cell 2) which operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 are given in Table A.10.4.3.2.2-1 and Table A.10.4.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.2.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1,2 |  | freq1 |
| DL CCA model | 1,2 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1,2 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | DRX.3 |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| EPRE ratio of PSS to SSS |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2 | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1,2 |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.10.4.3.2.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1,2 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1,2 |  | TBD | TBD | TBD | TBD |
| Note2 | 1,2 | dBm/15kHz | -94.65 | | | |
| Note2 | 1,2 | dBm/SSB SCS | -91.65 | | | |
|  | 1,2 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1,2 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1,2 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1,2 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.10.4.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.3.3 SSB based L1-RSRP measurement on SCC when DRX is not used

##### A.10.4.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.1.1-1.

Table A.10.4.3.3.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD  With CCA: 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 | |

##### A.10.4.3.3.2 Test parameters

There are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2), and FR1 SCell (Cell 3). Cell 2 and Cell 3 operate on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.10.4.3.3.2-1 and Table A.10.4.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.3.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PScell | 1,2 |  | Cell 2 |
| Active Scell | 1,2 |  | Cell 3 |
| RF Channel Number | 1,2 |  | 1: Cell 2  2: Cell 3 |
| DL CCA model | 1,2 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1,2 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | Off |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| EPRE ratio of PSS to SSS |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2 | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1,2 |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.10.4.3.3.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1, 2 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1, 2 |  | TBD | TBD | TBD | TBD |
| Note2 | 1**,** 2 | dBm/15kHz | -94.65 | | | |
| Note2 | 1**,** 2 | dBm/SSB SCS | -91.65 | | | |
|  | 1, 2 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1, 2 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1, 2 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1, 2 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.10.4.3.3.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 3.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.10.4.3.4 SSB based L1-RSRP measurement on SCC when DRX is used

##### A.10.4.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.4.1-1.

Table A.10.4.3.4.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD  With CCA: 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 | |

##### A.10.4.3.4.2 Test parameters

There are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2), and FR1 SCell (Cell 3). Cell 2 and Cell 3 operate on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.10.4.3.4.2-1 and Table A.10.4.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.4.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PScell | 1,2 |  | Cell 2 |
| Active Scell | 1,2 |  | Cell 3 |
| RF Channel Number | 1,2 |  | 1: Cell 2  2: Cell 3 |
| DL CCA model | 1,2 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1,2 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1,2 |  | TDD |
| TDD Configuration | 1,2 |  | TDDConf.1.1 CCA |
| BWchannel | 1,2 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,2 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1,2 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1,2 |  | CCR.1.1 CCA |
| SSB configuration | 1,2 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1,2 |  | OP.1 |
| Initial BWP Configuration | 1,2 |  | DLBWP.0.1 ULBWP.0.1 |
| Dedicated BWP configuration | 1,2 |  | DLBWP.1.1 ULBWP.1.1 |
| DBT Window Configuration | 1,2 |  | DBT.1 |
| TRS Configuration | 1,2 |  | TRS.1.2 TDD |
| DRX configuration | 1,2 |  | DRX.3 |
| reportConfigType | 1,2 |  | periodic |
| reportQuantity | 1,2 |  | ssb-Index-RSRP |
| Number of reported RS | 1,2 |  | 2 |
| L1-RSRP reporting period | 1,2 | slot | 80 |
| T1 | 1,2 | s | 5 |
| T2 | 1,2 | s | 1 |
| EPRE ratio of PSS to SSS |  |  |  |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2 | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1,2 |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.10.4.3.4.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1, 2 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1, 2 |  | TBD | TBD | TBD | TBD |
| Note2 | 1, 2 | dBm/15kHz | -94.65 | | | |
| Note2 | 1, 2 | dBm/SSB SCS | -91.65 | | | |
|  | 1, 2 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1, 2 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1, 2 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1, 2 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.10.4.3.4.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 3.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.10.5 Measurement performance

### A.10.5.1 SS-RSRP

### A.10.5.2 SS-RSRQ

### A.10.5.3 SS-SINR

### A.10.5.4 L1-RSRP measurement for beam reporting with CCA serving cell

#### A.10.5.4.1 SSB based L1-RSRP measurement

##### A.10.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.33.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.10.5.4.1.1-1.

Table A.10.5.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

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

##### A.10.5.4.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell under CCA (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model.

Two sub-tests (Test 1 and Test 2) are provided with different *Noc* on Cell 2. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 are given in Table A.10.5.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.10.5.4.1.2-1.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.10.5.4.1.2-1: FR1 SSB based L1-RSRP test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Config** | **Unit** | **Test 1** | **Test 2** |
| SSB GSCN | | 1,2 |  | freq1 | freq1 |
| DL CCA model | | 1,2 |  | As specifieed in A.3.20.2.1 | As specifieed in A.3.20.2.1 |
| UL CCA model | | 1,2 |  | As specified in A.3.20.2.2 | As specified in A.3.20.2.2 |
| Duplex mode | | 1,2 |  | TDD | TDD |
| TDD Configuration | | 1,2 |  | TDDConf.1.1 CCA | TDDConf.1.1 CCA |
| BWchannel | | 1,2 | MHz | 40: NRB,c = 106 | 40: NRB,c = 106 |
| Duplex mode | | 1,2 |  | TDD | TDD |
| TDD configuration | | 1,2 |  | TDDConf.1.1 CCA | TDDConf.1.1 CCA |
| PDSCH Reference measurement channel | | 1,2 |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel | | 1,2 |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | | 1,2 |  | CCR.1.1 CCA | CCR.1.1 CCA |
| SSB configuration for Semi-static channel access | | 1,2 |  | SSB.3 CCA | SSB.3 CCA |
| SSB configuration for Dynamic channel access | | 1,2 |  | SSB.4 CCA | SSB.4 CCA |
| OCNG Patterns | | 1,2 |  | OP.1 | OP.1 |
| TRS configuration | | 1,2 |  | TRS.1.2 TDD | TRS.1.2 TDD |
| Initial BWP Configuration | | 1,2 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | | 1,2 |  | DLBWP.1.1  ULBWP.1.1 | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | | 1,2 |  | DBT.1 | DBT.1 |
| reportConfigType | | 1,2 |  | periodic | periodic |
| reportQuantity | | 1,2 |  | ssb-Index-RSRP | ssb-Index-RSRP |
| Number of reported RS | | 1,2 |  | 2 | 2 |
| L1-RSRP reporting period | | 1,2 |  | slot80 | slot80 |
| EPRE ratio of PSS to SSS | | 1,2 | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | 1,2 |  |  |  |
| 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\_TDD\_FR1\_I | 1,2 | dBm/15kHz | -94.65 | [-113] |
| Note2 | NR\_TDD\_FR1\_I | 1,2 | dBm/SCS | -91.65 | [-110] |
|  | | 1,2 | dB | 10 | -3 |
| SS-RSRPNote3 | NR\_TDD\_FR1\_I | 1,2 | dBm/SCS | -81.65 | [-113] |
| IoNote3 | NR\_TDD\_FR1\_I | 1,2 | dBm/  38.16MHz | -50.19 | [-77.19] |
|  | | 1,2 | dB | 10 | -3 |
| Propagation condition | | 1,2 |  | AWGN | AWGN |
| Antenna configuration | | 1,2 |  | 1x2 | 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: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: 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 | | | | | |

##### A.10.5.4.1.3 Test Requirements

In both Test 1 and Test 2, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.33.1.

### A.10.5.5 RSSI

### A.10.5.5.1 RSSI measurement accuracy on PSCC with CCA

#### A.10.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

#### A.10.5.5.1.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. RSSI is measured on channel number 1. Supported test configurations are shown in table A.10.5.5.1.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.10.5.5.1.2-2 and A.10.5.5.1.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.5.1.2-1: RSSI supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.5.5.1.2-2: RSSI test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 |
| Cell 2 |
| RF Channel Number |  |  | 1 |
| BWchannel |  | MHz | 40 |
| PCCA\_DL |  |  | TBD |
| PCCA\_UL |  |  | TBD |
| DL CCA model |  |  | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth |
| Channel access bandwidth |  | MHz | 20 |
| DRX Cycle configuration |  | ms | Not Applicable |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.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) |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD |
| Propagation condition |  | - | AWGN |

Table A.10.5.5.1.2-3: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.10.5.5.1.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

### A.10.5.5.2 RSSI measurement accuracy on SCC with CCA

#### A.10.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

#### A.10.5.5.2.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, Cell 3 is SCell on a carrier frequency under CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.10.5.5.2.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.10.5.5.2.2-2 and A.10.5.5.2.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.5.2.2-1: RSSI supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.5.5.2.2-2: RSSI test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 2 | Cell 3 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |

Table A.10.5.5.2.2-3: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.10.5.5.2.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

### A.10.5.5.3 Inter-frequency RSSI measurement accuracy on a carrier with CCA

#### A.10.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.2.

#### A.10.5.5.3.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, and Cell 3 is the neighbour with CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.10.5.5.3.2-1. The accuracy of RSSI inter-frequency measurements is tested by using the parameters in A.10.5.5.3.2-2 and A.10.5.5.3.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.5.3.2-1: RSSI supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.5.5.3.2-2: RSSI test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 2 | Cell 3 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel |  |  | SR.1.1 TDD | NA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 TDD | NA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 TDD | NA |
| OCNG Patterns |  |  | OP.1 | NA |
| EPRE ratio of PSS to SSS |  | dB | 0 | NA |
| 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) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |

Table A.10.5.5.3.2-3: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.10.5.5.3.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.2. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

### A.10.5.6 Channel occupancy

### A.10.5.6.1 Channel occupancy measurement accuracy on PSCC with CCA

#### A.10.5.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

#### A.10.5.6.1.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Channel occupancy is measured on channel number 1. Supported test configurations are shown in table A.10.5.6.1.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.10.5.6.1.2-2 and A.10.5.6.1.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.6.1.2-1: CO supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.5.6.1.2-2: CO test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 |
| Cell 2 |
| RF Channel Number |  |  | 1 |
| BWchannel |  | MHz | 40 |
| PCCA\_DL |  |  | TBD |
| PCCA\_UL |  |  | TBD |
| DL CCA model |  |  | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth |
| Channel access bandwidth |  | MHz | 20 |
| DRX Cycle configuration |  | ms | Not Applicable |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.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) |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD |
| Propagation condition |  | - | AWGN |
| channelOccupancyThreshold |  | dBm | TBD |

Table A.10.5.6.1.2-3: CO RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.10.5.6.1.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

### A.10.5.6.2 Channel occupancy measurement accuracy on SCC with CCA

#### A.10.5.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

#### A.10.5.6.2.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, Cell 3 is SCell on a carrier frequency under CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.10.5.6.2.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.10.5.6.2.2-2 and A.10.5.6.2.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.6.2.2-1: CO supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.5.6.2.2-2: CO test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 2 | Cell 3 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |
| channelOccupancyThreshold |  | dBm | TBD | |

Table A.10.5.6.2.2-3: CO RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.10.5.6.2.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

### A.10.5.6.3 Inter-frequency channel occupancy measurement accuracy on a carrier with CCA

#### A.10.5.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.2.

#### A.10.5.6.3.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, and Cell 3 is the neighbour with CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.10.5.6.3.2-1. The accuracy of channel occupancy inter-frequency measurements is tested by using the parameters in A.10.5.6.3.2-2 and A.10.5.6.3.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.6.3.2-1: CO supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.10.5.5.3.2-2: CO test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 2 | Cell 3 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel |  |  | SR.1.1 TDD | NA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 TDD | NA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 TDD | NA |
| OCNG Patterns |  |  | OP.1 | NA |
| EPRE ratio of PSS to SSS |  | dB | 0 | NA |
| 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) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |
| channelOccupancyThreshold |  | dBm | TBD | |

Table A.10.5.6.3.2-3: CO RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.10.5.6.3.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

# A.11 NR Standalone Tests with NR PCell under CCA and Other NR Cells in FR1

*Editor’s note: Test cases for NR SA with NR PCell under CCA and SCell under CCA are also included here.*

## A.11.1 RRC\_IDLE state mobility

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

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

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

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

##### A.11.1.1.1.2 Test Parameters

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

Table A.11.1.1.1.2-1: Supported test configurations

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial | Active cell |  | 1 | Cell1 |  |
| condition | Neighbour cells |  | 1 | Cell2 |  |
| T2 end condition | Active cell |  | 1 | Cell2 |  |
| Neighbour cells |  | 1 | Cell1 |  |
| Final condition | Active cell |  | 1 | Cell1 |  |
| RF Channel Number | |  | 1 | 1 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | TBD |  |
| DBT Window Configuration | |  | 1 | TBD | As specified in clause A.3.21.1. |
| DL CCA model | |  | 1 | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | 1 | As specified in clause A.3.20.2.2 |  |
| DRX cycle length | | s | 1 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1 | Not configured |  |
| T1 | | s | 1 | TBD | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 1 | TBD | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1 | TBD | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1 | TBD | | | TBD | | |
| DL CCA probability PCCA\_DL |  | 1 | TBD | | | TBD | | |
| UL CCA probability PCCA\_UL |  | 1 | TBD | | | TBD | | |
| Md,max |  | 1 | 16 | | | 16 | | |
| Mm,max |  | 1 | 4 | | | 4 | | |
| Me,max |  | 1 | 8 | | | 8 | | |
| PDSCH RMC |  | 1 | TBD | | | TBD | | |
| RMSI CORESET |  | 1 | TBD | | | TBD | | |
| Dedicated CORESET |  | 1 | TBD | | | TBD | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -137 | | | -137 | | |
| Pcompensation | dB | 1 | 0 | | | 0 | | |
| Qhysts | dB | 1 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1 | SS-RSRP | | | SS-RSRP | | |
|  | dB | 1 | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | |
|  | dB | 1 | 16 | 13 | 16 | -infinity | 16 | 13 |
|  |
| SS-RSRP Note3 | dBm/SCS | 1 | -79 | -82 | -79 | -infinity | -79 | -82 |
|  |  |
|  |  |
| Io | dBm/38.16 MHz | 1 | -47.85 | -46.12 | -46.12 | pecified in Cell 1 columns- | | |
| Treselection | s | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | 1 | N50 | | | N50 | | |
| 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. | | | | | | | | |

##### A.11.1.1.1.3 Test Requirements

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

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

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

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

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

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

Where:

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

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

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

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

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

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

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

##### A.11.1.1.2.2 Test Parameters

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

Table A.11.1.1.2.2-1: Supported test configurations

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1 | Cell2 | The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1 |
| T1 end condition | Active cell |  | 1 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
| Neighbour cells |  | 1 | Cell2 |
| T3 end condition | Active cell |  | 1 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
| RF Channel Number | |  | 1 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | TBD |  |
| DBT Window Configuration | |  | 1 | TBD | As specified in clause A.3.21.1. |
| DL CCA model | |  | 1 | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | 1 | As specified in clause A.3.20.2.2 |  |
| DRX cycle length | | s | 1 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1 | Not configured |  |
| T1 | | s | 1 | TBD | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1 | TBD | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1 | TBD | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1 | TBD | | | TBD | | |
| DL CCA probability PCCA\_DL |  | 1 | TBD | | | TBD | | |
| UL CCA probability PCCA\_UL |  | 1 | TBD | | | TBD | | |
| Md,max |  | 1 | 16 | | | 16 | | |
| Mm,max |  | 1 | 4 | | | 4 | | |
| Me,max |  | 1 | 8 | | | 8 | | |
| PDSCH RMC |  | 1 | TBD | | | TBD | | |
| RMSI CORESET |  | 1 | TBD | | | TBD | | |
| Dedicated CORESET |  | 1 | TBD | | | TBD | | |
| OCNG Pattern |  | 1 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -137 | | | -137 | | |
|  |  |
| Pcompensation | dB | 1 | 0 | | | 0 | | |
| Qhysts | dB | 1 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1 | SS-RSRP | | | SS-RSRP | | |
|  | dB | 1 | 14 | 14 | 14 | -4 | -infinity | 12 |
| Note2 | dBm/SCS | 1 | -95 | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | |
|  | dB | 1 | 14 | 14 | 14 | -4 | -infinity | 12 |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -81 | -81 | -81 | -99 | -infinity | -83 |
|  |  |
|  |  |
| Io | dBm/38.16 MHz | 1 | -49.79 | -49.79 | -49.79 | -62.50 | -infinity | -51.69 |
|  |
|  |
| Treselection | s | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Snonintrasearch | dB | 1 | 50 | | | Not sent | | |
| Threshx, high | dB | 1 | 48 | | | 48 | | |
| Threshserving, low | dB | 1 | 44 | | | 44 | | |
| Threshx, low | dB | 1 | 50 | | | 50 | | |
| Propagation Condition |  | 1 | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

##### A.11.1.1.2.3 Test Requirements

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

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

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

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

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

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

Where:

Thigher\_priority\_search See clause 4.2.2.7

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

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

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

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

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

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

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

##### A.11.1.2.1.2 Test Parameters

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

Table A.11.1.2.1.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.1.2.1.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case when serving cell is subject to CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell2 | The UE camps on cell 2 which is subject to CCA in the initial phase and during T1 period the UE reselects to cell 1 which is an inter-frequency NR cell |
| T1 end condition | Active cell |  | 1, 2, 3 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
| Neighbour cells |  | 1, 2, 3 | Cell2 |
| T3 end condition | Active cell |  | 1, 2, 3 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
| RF Channel Number | |  | 1, 2, 3 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | Cell 1: SSB.1 FR1  Cell 2: SSB.1 CCA for semi-static channel access;  Cell 2: SSB.2 CCA for dynamic channel access |  |
|  | |  | 2 | Cell 1: SSB.1 FR1  Cell 2: SSB.1 CCA for semi-static channel access;  Cell 2: SSB.2 CCA for dynamic channel access |  |
|  | |  | 3 | Cell 1: SSB.2 FR1  Cell 2: SSB.1 CCA for semi-static channel access;  Cell 2: SSB.2 CCA for dynamic channel access |  |
| SMTCconfiguration | |  | 1 | Cell 1: SMTC pattern 2  Cell 2: N/A |  |
|  | |  | 2 | Cell 1: SMTC pattern 1  Cell 2: N/A |  |
|  | |  | 3 | Cell 1: SMTC pattern 1  Cell 2: N/A |  |
| DBT Window Configuration | |  | 1, 2, 3 | Cell 1: N/A  Cell 2: TBD | As specified in clause A.3.21.1. |
| DL CCA model | |  | 1, 2, 3 | Cell 1: N/A  Cell 2: TBD |  |
| UL CCA model | |  | 1, 2, 3 | Cell 1: N/A  Cell 2: As specified in clause A.3.20.2.2 |  |
| DRX cycle length | | s | 1, 2, 3 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | TBD | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3 | TBD | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2, 3 | TBD | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.11.1.2.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN when serving cell is subject to CCA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | | Cell 2 | | |
| T1 | T2 | T3 | | T1 | T2 | T3 |
| TDD configuration |  | 1 | N/A | | | | TDDConf.1.1.CCA | | |
|  |  | 2 | TDDConf.1.1 | | | | TDDConf.1.1.CCA | | |
|  |  | 3 | TDDConf.2.1 | | | | TDDConf.1.1.CCA | | |
| DL CCA probability PCCA\_DL |  | 1, 2, 3 | N/A | | | | TBD | | |
| UL CCA probability PCCA\_UL |  | 1, 2, 3 | N/A | | | | TBD | | |
| Md,max |  | 1, 2, 3 | N/A | | | | 16 | | |
| Mm,max |  | 1, 2, 3 | N/A | | | | 4 | | |
| Me,max |  | 1, 2, 3 | N/A | | | | 8 | | |
| PDSCH RMC |  | 1 | SR.1.1 FDD | | | | SR.1.1 CCA | | |
| configuration |  | 2 | SR.1.1 TDD | | | | SR.1.1 CCA | | |
|  |  | 3 | SR.2.1 TDD | | | | SR.1.1 CCA | | |
| RMSI CORESET |  | 1 | CR.1.1 FDD | | | | CR.1.1 CCA | | |
| RMC configuration |  | 2 | CR.1.1 TDD | | | | CR.1.1 CCA | | |
|  |  | 3 | CR.2.1 TDD | | | | CR.1.1 CCA | | |
| Dedicated CORESET |  | 1 | CCR.1.1 FDD | | | | CCR.1.1 CCA | | |
| RMC configuration |  | 2 | CCR.1.1 TDD | | | | CCR.1.1 CCA | | |
|  |  | 3 | CCR.2.1 TDD | | | | CCR.1.1 CCA | | |
| OCNG Pattern |  | 1, 2, 3 | OP.1 defined in A.3.2.1 | | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3 | SSB | | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2 | -140 | | | | -137 | | |
|  |  | 3 | -137 | | | | -137 | | |
| Pcompensation | dB | 1, 2, 3 | 0 | | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | | | SS-RSRP | | |
|  | dB | 1 | 14 | 14 | 14 | | -4 | -infinity | 12 |
|  |  | 2 |  |  |  | |  |  |  |
|  |  | 3 |  |  |  | |  |  |  |
| Note2 | dBm/SCS | 1 | -98 | | | -95 | | | |
|  |  | 2 | -98 | | | -95 | | | |
|  |  | 3 | -95 | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | |
|  |  | 2 |  | | | | | | |
|  |  | 3 |  | | | | | | |
|  | dB | 1 | 14 | 14 | 14 | | -4 | -infinity | 12 |
|  |  | 2 |  |  |  | |  |  |  |
|  |  | 3 |  |  |  | |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -84 | -84 | -84 | | -102 | -infinity | -86 |
|  |  | 2 | -84 | -84 | -84 | | -102 | -infinity | -86 |
|  |  | 3 | -81 | -81 | -81 | | -99 | -infinity | -83 |
| Io | dBm/9.36 MHz | 1 | -55.88 | -55.88 | -55.88 | | -68.60 | -infinity | -57.78 |
|  | dBm/9.36 MHz | 2 | -55.88 | -55.88 | -55.88 | | -68.60 | -infinity | -57.78 |
|  | dBm/38.16 MHz | 3 | -49.79 | -49.79 | -49.79 | | -62.50 | -infinity | -51.69 |
| Treselection | s | 1, 2, 3 | 0 | 0 | 0 | | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2, 3 | 50 | | | | 50 | | |
| Threshx, highP | dB | 1, 2, 3 | 48 | | | | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3 | 44 | | | | 44 | | |
| Threshx, lowP | dB | 1, 2, 3 | 50 | | | | 50 | | |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

##### A.11.1.2.1.3 Test Requirements

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

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

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

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

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

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

Where:

Thigher\_priority\_search See clause 4.2.2.7

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

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

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

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

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

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

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

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

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

##### A.11.1.3.1.2 Test Parameters

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

Table A.11.1.3.1.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell without CCA | Description of a cell with CCA |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell2 | The UE camps on cell 2 which is an inter-frequency NR cell in the initial phase and during T1 period the UE reselects to cell 1 which is cell subject to CCA |
|  | Neighbour cell |  | 1, 2, 3 | Cell 1 |  |
| T1 end condition | Active cell |  | 1, 2, 3 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
|  | Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2, 3 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
|  | Neighbour cell |  | 1, 2, 3 | Cell 1 |  |
| RF Channel Number | |  | 1, 2, 3 | 1, 2 |  |
| Time offset between cells | |  | 1 | 3 ms | Asynchronous cells |
|  | |  | 2 | 3 μs | Synchronous cells |
|  | |  | 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | Cell 1: SSB.1 CCA for semi-static channel access;  Cell 1: SSB.2 CCA for dynamic channel access;  Cell 2: SSB.1 FR1 |  |
|  | |  | 2 | Cell 1: SSB.1 CCA for semi-static channel access;  Cell 1: SSB.2 CCA for dynamic channel access;  Cell 2: SSB.1 FR1 |  |
|  | |  | 3 | Cell 1: SSB.1 CCA for semi-static channel access;  Cell 1: SSB.2 CCA for dynamic channel access; Cell 2: SSB.2 FR1 |  |
| SMTCconfiguration | |  | 1 | Cell 1: TBD  Cell 2: SMTC.2 |  |
|  | |  | 2 | Cell 1: TBD  Cell 2: SMTC.1 |  |
|  | |  | 3 | Cell 1: TBD  Cell 2: SMTC.1 |  |
| DBT Window Configuration | |  | 1, 2, 3 | Cell 1: TBD  Cell 2: N/A | As specified in clause A.3.21.1. |
| DL CCA model | |  | 1, 2, 3 | Cell 1: TBD  Cell 2: N/A |  |
| UL CCA model | |  | 1, 2, 3 | Cell 1: TBD  Cell 2: N/A |  |
| DRX cycle length | | s | 1, 2, 3 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | TBD | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3 | TBD | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2, 3 | TBD | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.11.1.3.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN when target cell is subject to CCA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | | Cell 2 | | |
| T1 | T2 | T3 | | T1 | T2 | T3 |
| TDD configuration |  | 1 | TDDConf.1.1.CCA | | | | N/A | | |
|  |  | 2 | TDDConf.1.1.CCA | | | | TDDConf.1.1 | | |
|  |  | 3 | TDDConf.1.1.CCA | | | | TDDConf.2.1 | | |
| DL CCA probability PCCA\_DL |  | 1, 2, 3 | TBD | | | | N/A | | |
| UL CCA probability PCCA\_UL |  | 1, 2, 3 | TBD | | | | N/A | | |
| Md,max |  | 1, 2, 3 | 16 | | | | N/A | | |
| Mm,max |  | 1, 2, 3 | 4 | | | | N/A | | |
| Me,max |  | 1, 2, 3 | 8 | | | | N/A | | |
| PDSCH RMC |  | 1 | SR.1.1 CCA | | | | SR.1.1 FDD | | |
| configuration |  | 2 | SR.1.1 CCA | | | | SR.1.1 TDD | | |
|  |  | 3 | SR.1.1 CCA | | | | SR.2.1 TDD | | |
| RMSI CORESET |  | 1 | CR.1.1 CCA | | | | CR.1.1 FDD | | |
| RMC configuration |  | 2 | CR.1.1 CCA | | | | CR.1.1 TDD | | |
|  |  | 3 | CR.1.1 CCA | | | | CR.2.1 TDD | | |
| Dedicated CORESET |  | 1 | CCR.1.1 CCA | | | | CCR.1.1 FDD | | |
| RMC configuration |  | 2 | CCR.1.1 CCA | | | | CCR.1.1 TDD | | |
|  |  | 3 | CCR.1.1 CCA | | | | CCR.2.1 TDD | | |
| OCNG Pattern |  | 1, 2, 3 | OP.1 defined in A.3.2.1 | | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3 | SSB | | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2 | -137 | | | | -140 | | |
|  |  | 3 | -137 | | | | -137 | | |
| Pcompensation | dB | 1, 2, 3 | 0 | | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | | | SS-RSRP | | |
|  | dB | 1 | TBD | TBD | TBD | | -4 | -infinity | 12 |
|  |  | 2 |  |  |  | |  |  |  |
|  |  | 3 |  |  |  | |  |  |  |
| Note2 | dBm/SCS | 1 | -95 | | | -98 | | | |
|  |  | 2 | -95 | | | -98 | | | |
|  |  | 3 | -95 | | | | | | |
| Note2 | dBm/15 kHz | 1 | -98 | | | | | | |
|  |  | 2 |  | | | | | | |
|  |  | 3 |  | | | | | | |
|  | dB | 1 | 14 | 14 | 14 | | -4 | -infinity | 12 |
|  |  | 2 |  |  |  | |  |  |  |
|  |  | 3 |  |  |  | |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -84 | -84 | -84 | | -102 | -infinity | -86 |
|  |  | 2 | -84 | -84 | -84 | | -102 | -infinity | -86 |
|  |  | 3 | -81 | -81 | -81 | | -99 | -infinity | -83 |
| Io | dBm/9.36 MHz | 1 | -55.88 | -55.88 | -55.88 | | -68.60 | -infinity | -57.78 |
|  | dBm/9.36 MHz | 2 | -55.88 | -55.88 | -55.88 | | -68.60 | -infinity | -57.78 |
|  | dBm/38.16 MHz | 3 | -49.79 | -49.79 | -49.79 | | -62.50 | -infinity | -51.69 |
| Treselection | s | 1, 2, 3 | 0 | 0 | 0 | | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2, 3 | 50 | | | | 50 | | |
| Threshx, highP | dB | 1, 2, 3 | 48 | | | | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3 | 44 | | | | 44 | | |
| Threshx, lowP | dB | 1, 2, 3 | 50 | | | | 50 | | |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

##### A.11.1.3.1.3 Test Requirements

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

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

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

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

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

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

Where:

Thigher\_priority\_search See clause 4.2.2.7

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

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

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

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

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

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

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

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

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

##### A.11.1.4.1.2 Test Parameters

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

Table A.11.1.4.1.2-1: Supported test configurations

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 | The UE camps on cell 1 in the initial phase and during T2 period the UE reselects to cell 2. |
| T2 end | Active cell |  | 1, 2 | Cell2 | The UE shall perform reselection to cell |
| condition | Neighbour cells |  | 1, 2 | Cell1 | 2 during T2. |
| T3 end | Active cell |  | 1, 2 | Cell1 | The UE shall perform reselection to cell |
| condition | Neighbour cells |  | 1, 2 | Cell2 | 1 during T3 for iteration of the tests. |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | TBD |  |
| DBT Window Configuration | |  | 1, 2 | TBD | As specified in clause A.3.21.1. |
| SSB configuration | |  |  | Cell 1: SSB.1 CCA for semi-static channel access;  Cell 1: SSB.2 CCA for dynamic channel access; |  |
| DL CCA model | |  | 1, 2 | TBD |  |
| UL CCA model | |  | 1, 2 | TBD |  |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
| 2 | 4 |
| E-UTRAN PRACH | |  | 1 | 53 | As specified in table 5.7.1-2 in |
| configuration index | |  | 2 | 4 | TS 36.211 [23] |
| T1 | | s | 1, 2 | TBD | During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | | s | 1, 2 | TBD | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2 | TBD | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | |
| **T1** | **T2** | **T3** |
| TDD configuration |  | 1, 2 | TDDConf.1.1.CCA | | |
| DL CCA probability PCCA\_DL |  | 1, 2 | TBD | | |
| UL CCA probability PCCA\_UL |  | 1, 2 | TBD | | |
| Md,max |  | 1, 2 | 16 | | |
| Mm,max |  | 1, 2 | 4 | | |
| Me,max |  | 1, 2 | 8 | | |
| PDSCH parameters |  | 1, 2 | SR.1.1 CCA | | |
| RMSI CORESET parameters |  | 1, 2 | CR.1.1 CCA | | |
| Dedicated CORESET parameters |  | 1, 2 | CCR.1.1 CCA | | |
| SSB parameters |  | 1, 2 | TBD | | |
| NR SMTC parameters |  | 1, 2 | TBD | | |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0 | | |
| RLM-RS |  | 1, 2 | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2 | -137 | | |
|  | dBm/SCS | 1, 2 | -95 | | |
|  | dBm/15 kHz | 1, 2 | -98 | | |
| SS-RSRP |  | 1, 2 | -81 | -81 | -81 |
|  | dB | 1, 2 | 14 | 14 | 14 |
|  | dB | 1, 2 | 14 | 14 | 14 |
| Io | dBm/38.16 MHz | 1, 2 | -49.79 | -49.79 | -49.79 |
| Treselection | S | 1, 2 | 0 | | |
| Snonintrasearch | dB | 1, 2 | 50 | | |
| Threshx, high (Note 2) | dB | 1, 2 | 48 | | |
| Threshserving, low | dB | 1, 2 | 44 | | |
| Threshx, low | dB | 1, 2 | 50 | | |
| Propagation Condition |  | 1, 2 | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in NR system information, and is a threshold for the E-UTRA target cell | | | | | |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 2** | | | |
| **T1** | **T2** | | **T3** |
| E-UTRA RF Channel number |  | 1 | | | |
| BWchannel | MHz | 10 | | | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | | | |
| PBCH\_RA | dB | 0 | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | | | |
|  | dBm/15 kHz | -98 | | | |
| RSRP | dBm/15 KHz | -infinity | | -86 | -102 |
|  | dB | -infinity | | 12 | -4 |
|  | dB | -infinity | | 12 | -4 |
| TreselectionEUTRAN | S | 0 | | | |
| Snonintrasearch | dB | Not sent | | | |
| Threshx, high (Note 2) | dB | 48 | | | |
| Threshserving, low | dB | 44 | | | |
| Threshx, low | dB | 50 | | | |
| Propagation Condition |  | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | | | |

##### A.11.1.4.1.3 Test Requirements

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

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

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

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

Where:

Thigher\_priority\_search See clause 4.2.2.7

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

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

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

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

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

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

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

Table A.11.1.4.2.1-1: Supported test configurations

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 | The UE camps on cell 1 in the initial phase. |
| T1 end condition | Active cell |  | 1, 2 | Cell2 | The UE shall perform reselection to cell 2 during T1. |
| Neighbour cells |  | 1, 2 | Cell1 |
| T2 end condition | Active cell |  | 1, 2 | Cell1 | The UE shall perform reselection to cell 1 during T2 for iteration of the tests. |
| Neighbour cells |  | 1, 2 | Cell2 |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | TBD |  |
| DBT Window Configuration | |  | 1, 2 | TBD | As specified in clause A.3.21.1. |
| DL CCA model | |  | 1, 2 | TBD |  |
| UL CCA model | |  | 1, 2 | TBD |  |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH | |  | 1 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
| configuration index | |  | 2 | 4 |
| T1 | | s | 1, 2 | TBD | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2 | TBD | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | |
| **T1** | **T2** |
| TDD configuration |  | 1, 2 | TDDConf.1.1.CCA | |
| DL CCA probability PCCA\_DL |  | 1, 2 | TDDConf.1.1.CCA | |
| UL CCA probability PCCA\_UL |  | 1, 2 | TDDConf.1.1.CCA | |
| Md,max |  | 1, 2 | 16 | |
| Mm,max |  | 1, 2 | 4 | |
| Me,max |  | 1, 2 | 8 | |
| PDSCH RMC configuration |  | 1, 2 | SR.1.1 CCA | |
| RMSI CORESET RMC  Configuration |  | 1, 2 | CR.1.1 CCA | |
| Dedicated CORESET RMC |  | 1, 2 | CCR.1.1 CCA | |
| Configuration |
| SSB configuration |  | 1, 2 | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access | |
|  |
| SMTC configuration |  | 1, 2 | TBD | |
|  |
|  |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0 | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0 | |
| RLM-RS |  | 1, 2 | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2 | -137 | |
|  | dBm/SCS | 1, 2 | -95 | |
|  | dBm/15 kHz | 1, 2 | -98 | |
| SS-RSRP | dBm/SCS | 1, 2 | -99 | -83 |
|  | dB | 1, 2 | -4 | 12 |
|  |  |  |  |
|  |  |  |  |
|  | dB | 1, 2 | -4 | 12 |
|  |  |  |  |
|  |  |  |  |
| Io | dBm/38.16 MHz | 1, 2 | -62.50 | -51.69 |
| Treselection | S | 1, 2 | 0 | |
| Snonintrasearch | dB | 1, 2 | 50 | |
| Threshx, high (Note 2) | dB | 1, 2 | 48 | |
| Threshserving, low | dB | 1, 2 | 44 | |
| Threshx, low | dB | 1, 2 | 50 | |
| Propagation Condition |  | 1, 2 | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in NR system information, and is a threshold for the E-UTRA target cell | | | | |

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

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
| T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -84 | -84 |
|  | dB | 14 | 14 |
|  | dB | 14 | 14 |
| TreselectionEUTRAN | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| Threshx, high (Note 2) | dB | 48 | |
| Threshserving, low | dB | 44 | |
| Threshx, low | dB | 50 | |
| Propagation Condition |  | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | |

##### A.11.1.4.2.2 Test Requirements

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

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

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

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

Where:

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

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

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

## A.11.2 RRC\_CONNECTED state mobility

### A.11.2.1 Handover

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

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

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

##### A.11.2.1.1.2 Test Parameters

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

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤ 5 |  |
| T3 | | s | ≥ Tinterrupt | Tinterrupt is defined in clause 6.1B.1.2 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | | | Cell 2 | | | | |
|  | | |  | T1 | | T2 | | T3 | | T1 | | T2 | | T3 |
| NR RF Channel Number | | |  | 1 | | | | | | 1 | | | | |
| CCA model | | |  | TBD | | | | | | TBD | | | | |
| PCCA\_DL | | |  | [TBD] | | | | | | [TBD] | | | | |
| PCCA\_UL | | |  | [TBD] | | | | | | [TBD] | | | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | | | | | |
| BWchannel | | Config 1 |  | 40: NRB,c = 106 | | | | | | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | | | | | |
| PDSCH Reference | | Config 1 |  | SR.1.1 CCA | | | | | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | | | | | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 TDD | | | | | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | | | | | |
| DBT window configuration | | Config 1 |  | DBT.1 | | | | | | | | | | |
| SSB configuration for semi-static channel access | | Config 1 |  | SSB.1 CCA | | | | | | | | | | |
| SSB configuration for dynamic channel access | | Config 1 |  | SSB.2 CCA | | | | | | | | | | |
| ssb-PositionQCL | | Config 1 |  | [1] | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | | | | | |
| Note2 | Config 1 | | dBm/SCS | -95 | | | | | | | | | | |
|  | | | dB | 8 | -3.3 | | -3.3 | | -Infinity | | 2.36 | | 2.36 | |
|  | | | dB | 8 | 8 | | 8 | | -Infinity | | 11 | | 11 | |
| SSB\_RP | Config 1 | | dBm/SCS | -87 | -87 | | -87 | | -Infinity | | -84 | | -84 | |
| IoNote3 | Config 1 | | dBm/  38.16MHz | -55.31 | -50.96 | | -50.96 | | -55.31 | | -50.96 | | -50.96 | |
| Propagation condition | | | - | AWGN | | | | | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | | | | |

##### A.11.2.1.1.3 Test Requirements

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

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

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

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

Tsearch = 0.

Tprocessing = 20 ms.

Tmargin = 2 ms.

T∆ = (1+ L2) \*20 ms.

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

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

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

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

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

##### A.11.2.1.2.2 Test Parameters

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≥ Tinterrupt | Tinterrupt is defined in clause 6.1B.1.2 |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 1 | | |
| CCA model | | |  | TBD | | | | TBD | | |
| PCCA\_DL | | |  | [TBD] | | | | [TBD] | | |
| PCCA\_UL | | |  | [TBD] | | | | [TBD] | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | |
| BWchannel | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference | | Config 1 |  | SR.1.1 CCA | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | |
| DBT window configuration | | Config 1 |  | DBT.1 | | | | | | |
| SSB configuration for semi-static channel access | | Config 1 |  | SSB.1 CCA | | | | | | |
| SSB configuration for dynamic channel access | | Config 1 |  | SSB.2 CCA | | | | | | |
| ssb-PositionQCL | | Config 1 |  | [1] | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | |
| Note2 | Config 1 | | dBm/SCS | -95 | | | | | | |
|  | | | dB | 8 | -0.64 | | -Infinity | | -0.64 | |
|  | | | dB | 8 | 8 | | -Infinity | | 8 | |
| SSB\_RP | Config 1 | | dBm/SCS | -87 | -87 | | -Infinity | | -87 | |
| IoNote3 | Config 1 | | dBm/  38.16MHz | -55.31 | -52.60 | | -55.31 | | -52.60 | |
| Propagation condition | | | - | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | |

##### A.11.2.1.2.3 Test Requirements

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

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

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

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

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

Tprocessing = 20 ms.

Tmargin = 2 ms.

T∆ = (1+ L2) \*20 ms.

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

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

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

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

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

##### A.11.2.1.3.2 Test Parameters

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 5 |  |
| T2 | | s | ≤ Tinterrupt | Tinterrupt is defined in clause 6.1B.1.2 |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| CCA model | | |  | TBD | | | | TBD | | |
| PCCA\_DL | | |  | [TBD] | | | | [TBD] | | |
| PCCA\_UL | | |  | [TBD] | | | | [TBD] | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | |
| BWchannel | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference | | Config 1 |  | SR.1.1 CCA | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR1.1 CCA | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | |
| DBT window configuration | | Config 1 |  | DBT.1 | | | | | | |
| SSB configuration for semi-static channel access | | Config 1 |  | SSB.1 CCA | | | | | | |
| SSB configuration for dynamic channel access | | Config 1 |  | SSB.2 CCA | | | | | | |
| ssb-PositionQCL | | Config 1 |  | [1] | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | |
| Note2 | Config 1 | | dBm/SCS | -95 | | | | | | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
| SSB\_RP | Config 1 | | dBm/SCS | -91 | -91 | | -Infinity | | -90 | |
| IoNote3 | Config 1 | | dBm/  38.16MHz | -58.49 | -58.49 | | -63.94 | | -57.75 | |
| Propagation condition | | | - | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | |

##### A.11.2.1.3.3 Test Requirements

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

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

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

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

Tsearch = (3+L1’)\* 20 ms.

Tprocessing = 20 ms.

Tmargin = 2 ms.

T∆ = (1+ L2) \*20 ms.

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

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

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

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

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

##### A.11.2.1.4.2 Test Parameters

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

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

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.2.1.4.2-2: General test parameters handover from NR with CCA FR1 to NR FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | NR cell with CCA |
|  | Neighbouring cell |  | Cell 2 | NR cell |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Test | Cell 1 | | | Cell 2 | | |
|  | | | |  | configuration | T1 | T2 | T3 | T1 | T2 | T3 |
| NR RF Channel Number | | | |  | 1,2,3 | 1 | | | 2 | | |
| Duplex mode | | | |  | 1 | TDD | | | FDD | | |
|  | | | |  | 2 | TDD | | | TDD | | |
|  | | | |  | 3 | TDD | | | TDD | | |
| TDD configuration | | | |  | 1 | TDDConf.1.1 CCA | | | Not Applicable | | |
|  | | | |  | 2 | TDDConf.1.1 CCA | | | TDDConf.1.1 | | |
|  | | | |  | 3 | TDDConf.1.1 CCA | | | TDDConf.2.1 | | |
| BWchannel | | | | MHz | 1 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | | |
|  | | | |  | 2 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | | |
|  | | | |  | 3 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | | |
| BWP BW | | | | MHz | 1 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | | |
|  | | | |  | 2 | 40: NRB,c = 106 | | | 10: NRB,c = 52 | | |
|  | | | |  | 3 | 40: NRB,c = 106 | | | 40: NRB,c = 106 | | |
| DRX Cycle | | | | ms | 1,2,3 | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | | |  | 1 | SR.1.1 CCA | | | SR.1.1 FDD | | |
|  | | | |  | 2 | SR.1.1 CCA | | | SR.1.1 TDD | | |
|  | | | |  | 3 | SR.1.1 CCA | | | SR2.1 TDD | | |
| CORESET Reference Channel | | | |  | 1 | CR2.1 TDD | | | CR.1.1 FDD | | |
|  | | | |  | 2 | CR2.1 TDD | | | CR.1.1 TDD | | |
|  | | | |  | 3 | CR2.1 TDD | | | CR2.1 TDD | | |
| TRS configuration | | | |  | 1 | TRS.1.2 TDD | | | TRS.1.1 FDD | | |
|  | | | |  | 2 | TRS.1.2 TDD | | | TRS.1.1 TDD | | |
|  | | | |  | 3 | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| OCNG Patterns | | | |  |  | OP.1 | | | | | |
| SMTC Configuration | | | |  |  | SMTC.1 | | | | | |
| SSB Configuration | | Semi-static channel access | |  | 1,2 | SSB.1 CCA  (As defined in A.3.10A ) | | | SSB.1 FR1 | | |
| Dynamic channel access | |  |  | SSB.2 CCA  (As defined in A.3.10A ) | | |  | | |
|  | | Semi-static channel access | |  | 3 | SSB.1 CCA  (As defined in A.3.10A ) | | | SSB.2 FR1 | | |
|  | | Dynamic channel access | |  |  | SSB.2 CCA  (As defined in A.3.10A ) | | |  | | |
| DBT window configuration | | | |  |  | As defined in A.3.21.1 | | | Not applicable | | |
| PDSCH/PDCCH subcarrier spacing | | | | kHz | 1,2 | 30 kHz | | | 15 kHz | | |
|  | | | |  | 3 | 30 kHz | | | 30 kHz | | |
| PUCCH/PUSCH subcarrier spacing | | | | kHz | 1,2 | 30 kHz | | | 15 kHz | | |
|  | | | |  | 3 | 30 kHz | | | 30 kHz | | |
| PRACH configuration | | | |  |  | TBD | | | FR1 PRACH configuration 1 | | |
| BWP configuration | | Initial DL BWP | |  | 1,2,3 | DLBWP.0.1 | | | | | |
|  | | Dedicated DL BWP | |  | 1,2,3 | DLBWP.1.1 | | | | | |
|  | | Initial UL BWP | |  | 1,2,3 | ULBWP.0.1 | | | | | |
|  | | Dedicated UL BWP | |  | 1,2,3 | ULBWP.1.1 | | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 1,2,3 | 0 | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | | 1,2,3 |
| EPRE ratio of PBCH to PBCH DMRS | | | | 1,2,3 |
| EPRE ratio of PDCCH DMRS to SSS | | | | 1,2,3 |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | 1,2,3 |
| EPRE ratio of PDSCH DMRS to SSS | | | | 1,2,3 |
| EPRE ratio of PDSCH to PDSCH | | | | 1,2,3 |
| EPRE ratio of OCNG DMRS to SSSNote1 | | | | 1,2,3 |
| EPRE ratio of OCNG to OCNG DMRSNote1 | | | | 1,2,3 |
| Note2 | | | | dBm/SCS | 1,2 | [-101] | | | -98 | | |
|  | | | |  | 3 | [-101] | | | -95 | | |
|  | | | | dB | 1,2,3 | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
|  | | | | dB | 1,2,3 | 8 | 8 | 8 | -Infinity | 11 | 11 |
| SSB\_RP | Config 1 | | | dBm/SCS | 1,2,3 | -90 | -90 | -90 | -Infinity | -87 | -87 |
| IoNote3 | Config 1 | | | dBm/  9.36MHz | 1,2,3 | -61.41 | -57.06 | -57.06 | -61.41 | -57.06 | -57.06 |
| Propagation condition | | | | - | 1,2,3 | AWGN | | | AWGN | | |
|  | | | Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

##### A.11.2.1.4.3 Test Requirements

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

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

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

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

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

This gives a total of 112 ms.

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

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

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

##### A.11.2.1.5.2 Test Parameters

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

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

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.2.1.5.2-2: General test parameters handover from NR with CCA FR1 to NR FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | NR cell with CCA |
|  | Neighbouring cell |  | Cell 2 | NR cell |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3 | 1 | | 2 | |
| Duplex mode |  | 1 | TDD | | FDD | |
|  | 2 | TDD | | TDD | |
|  | 3 | TDD | | TDD | |
| CCA model |  | 1, 2, 3 | TBD | | N/A | |
| TDD configuration |  | 1 | TDDConf.1.1 CCA | | Not Applicable | |
|  | 2 | TDDConf.1.1 CCA | | TDDConf.1.1 | |
|  | 3 | TDDConf.1.1 CCA | | TDDConf.2.1 | |
| BWchannel | MHz | 1 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| 2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | MHz | 1 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| 2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| DRX Cycle | ms |  | Not Applicable | | | |
| PDSCH Reference measurement channel |  | 1 | SR.1.1 CCA | | SR.1.1 FDD | |
|  | 2 | SR.1.1 CCA | | SR.1.1 TDD | |
|  | 3 | SR.1.1 CCA | | SR2.1 TDD | |
| CORESET Reference Channel |  | 1 | CR2.1 TDD | | CR.1.1 FDD | |
|  | 2 | CR2.1 TDD | | CR.1.1 TDD | |
|  | 3 | CR2.1 TDD | | CR2.1 TDD | |
| TRS configuration |  | 1 | TRS.1.2 TDD | | TRS.1.1 FDD | |
|  | 2 | TRS.1.2 TDD | | TRS.1.1 TDD | |
|  | 3 | TRS.1.2 TDD | | TRS.1.2 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | | |
| SMTC Configuration |  | 1, 2, 3 | SMTC.1 | | | |
| DBT window configuration |  | 1, 2, 3 | As defined in A.3.21.1 | | N/A | |
| SSB configuration | Semi-static channel access | 1,2 | SSB.1 CCA  (As defined in A.3.10A ) | | SSB.1 FR1 | |
| Dynamic channel access |  | SSB.2 CCA  (As defined in A.3.10A ) | |
| Semi-static channel access | 3 | SSB.1 CCA  (As defined in A.3.10A ) | | SSB.2 FR1 | |
| Dynamic channel access |  | SSB.2 CCA  (As defined in A.3.10A ) | |
| ssb-PositionQCL |  |  | [1] | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 30 kHz | | 15 kHz | |
| 2 | 30 kHz | | 15 kHz | |
| 3 | 30 kHz | | 30 kHz | |
| PUCCH/PUSCH subcarrier spacing | kHz | 1 | 30 kHz | | 15 kHz | |
| 2 | 30 kHz | | 15 kHz | |
| 3 | 30 kHz | | 30 kHz | |
| PRACH configuration |  | 1,2,3 | FR1 PRACH configuration 1 | | | |
| BWP configuration | Initial DL BWP | 1,2,3 | DLBWP.0.1 | | | |
| Dedicated DL BWP | 1,2,3 | DLBWP.1.1 | | | |
| Initial UL BWP | 1,2,3 | ULBWP.0.1 | | | |
| Dedicated UL BWP | 1,2,3 | ULBWP.1.1 | | | |
| EPRE ratio of PSS to SSS | dB | 1,2,3 | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | 1,2,3 |
| EPRE ratio of PBCH to PBCH DMRS | 1,2,3 |
| EPRE ratio of PDCCH DMRS to SSS | 1,2,3 |
| EPRE ratio of PDCCH to PDCCH DMRS | 1,2,3 |
| EPRE ratio of PDSCH DMRS to SSS | 1,2,3 |
| EPRE ratio of PDSCH to PDSCH | 1,2,3 |
| EPRE ratio of OCNG DMRS to SSSNote1 | 1,2,3 |
| EPRE ratio of OCNG to OCNG DMRSNote1 | 1,2,3 |
| Note2 | dBm/SCS | 1,2,3 | [-101] | | -98 | |
|  | [-101] | | -95 | |
|  | dB | 1,2,3 | -Infinity | 5 | 4 | 4 |
|  | dB | 1,2,3 | -Infinity | 5 | 4 | 4 |
| SSB\_RP | dBm/SCS | 1,2,3 | -Infinity | -93 | -94 | -94 |
|  | -Infinity | -90 | -91 | -91 |
| IoNote3 | dBm/  9.36MHz | 1,2,3 | -70.05 | -63.85 | -64.59 | -64.59 |
|  | dBm/  38.16MHz | 1,2,3 | -63.94 | -57.75 | -58.49 | -58.49 |
| Propagation condition | - | 1,2,3 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.11.2.1.5.3 Test Requirements

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

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

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

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

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

This gives a total of 132 ms.

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

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

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

##### A.11.2.1.6.2 Test Parameters

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

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

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

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.2.1.6.2-2: General test parameters Inter-frequency handover from FR1 to FR1 carrier under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 5 |  |
| T2 | | s | ≤ Tinterrupt | Tinterrupt is defined in clause 6.1B.1.2 |

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number | |  | 1, 2, 3 | 1 | | 2 | |
| CCA model | |  | 1, 2, 3 | N/A | | TBD | |
| TDD configuration | |  | 1 | N/A | | TDDConf.1.1.CCA | |
|  | 2 | TDDConf.1.1 | | TDDConf.1.1.CCA | |
|  | 3 | TDDConf.1.2 | | TDDConf.1.1.CCA | |
| BWchannel | |  | 1 | 10: NRB,c = 52 | | 40: NRB,c = 106 | |
|  | 2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | |
|  | 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | |  | 1 | 10: NRB,c = 52 | | 40: NRB,c = 106 | |
|  | 2 | 10: NRB,c = 52 | | 40: NRB,c = 106 | |
|  | 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| DRX Cycle | | ms |  | Not Applicable | | | |
| PDSCH Reference | |  | 1 | SR.1.1 FDD | | SR.1.1 CCA | |
|  | 2 | SR.1.1 TDD | | SR.1.1 CCA | |
|  | 3 | SR.2.1 TDD | | SR.1.1 CCA | |
| CORESET Reference Channel | |  | 1 | CR.1.1 FDD | | Table TBD | |
|  | 2 | CR.1.1 TDD | | Table TBD | |
|  | 3 | CR.2.1 TDD | | Table TBD | |
| TRS configuration | |  | 1 | TRS.1.1 FDD | | TRS.1.2 TDD | |
|  | 2 | TRS.1.1 TDD | | TRS.1.2 TDD | |
|  | 3 | TRS.1.2 TDD | | TRS.1.2 TDD | |
| OCNG Patterns | |  | 1, 2, 3 | OP.1 | | | |
| SMTC Configuration | |  | 1, 2, 3 | SMTC.1 | | | |
| DBT window configuration | |  | 1, 2, 3 | N/A | | As defined in A.3.21.1 | |
| SSB configuration | |  | 1, 2 | SSB.1 FR1 | | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access; | |
|  | 3 | SSB.2 FR1 | | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access; | |
| ssb-PositionQCL | |  |  | N/A | | [1] | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 15 kHz | | 30 kHz | |
| 2 | 15 kHz | | 30 kHz | |
| 3 | 30 kHz | | 30 kHz | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 1 | 15 kHz | | 30 kHz | |
| 2 | 15 kHz | | 30 kHz | |
| 3 | 30 kHz | | 30 kHz | |
| PRACH configuration | |  |  | FR1 PRACH configuration 1 | | | |
| BWP configuration | Initial DL BWP |  | 1, 2, 3 | DLBWP.0.1 | | | |
|  | Dedicated DL BWP |  | 1, 2, 3 | DLBWP.1.1 | | | |
|  | Initial UL BWP |  | 1, 2, 3 | ULBWP.0.1 | | | |
|  | Dedicated UL BWP |  | 1, 2, 3 | ULBWP.1.1 | | | |
| EPRE ratio of PSS to SSS | | dB |  | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |
| EPRE ratio of PDSCH to PDSCH | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |
| Note2 | | dBm/15kHz |  | -98 | | | |
| Note2 | Config 1 | dBm/SCS | 1, 2 | -98 | | | |
|  | 3 | -95 | | | |
|  | | dB |  | 4 | 4 | -Infinity | 5 |
|  | | dB |  | 4 | 4 | -Infinity | 5 |
| SSB\_RP | Config 1 | dBm/SCS | 1, 2 | -94 | -94 | -Infinity | -93 |
|  | 3 | -91 | -91 | -Infinity | -90 |
| IoNote3 | Config 1 | dBm/  9.36MHz | 1, 2 | -64.59 | -64.59 | -70.05 | -63.85 |
|  | dBm/  38.16MHz | 3 | -58.49 | -58.49 | -63.94 | -57.75 |
| Propagation condition | | - |  | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

##### A.11.2.1.6.3 Test Requirements

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

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

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

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

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

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

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

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

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | NR cell on a carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | E-UTRAN cell |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | As specified in Table A.11.2.1.7-3 | Absolute NR SS-RSRP threshold for event B2 |
| b2-Threshold2EUTRAN | | dBm | -98 | Absolute E-UTRAN RSRP threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 9.1.2-1 started before T2 starts |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | |
|  | |  |  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2 | 1 | | |
| TDD Configuration | |  | 1, 2 | TDDConf.1.1.CCA | | |
| BWchannel | |  | 1, 2 | 40: NRB,c = 106 (TDD) | | |
| PDSCH reference measurement channel | |  | 1, 2 | SR.1.1 CCA | | |
| CORESET reference channel | |  | 1, 2 | TBD | | |
| TRS configuration | |  | 1, 2 | TRS.1.2 TDD | | |
| OCNG patternNote1 | |  | 1, 2 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2 | DLBWP.0.1 | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | |
| SMTC configuration | |  | 1, 2 | SMTC.1 | | |
| DBT window configuration | |  | 1, 2 | As defined in A.3.21.1 | | |
| SSB configuration | |  | 1, 2 | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access; | | |
| b2-Threshold1 | | dBm | 1, 2 | -93 | | |
| EPRE ratio of PSS to SSS | | dB | 1, 2 | 0 | | |
| EPRE ratio of PBCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PBCH to PBCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDCCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDSCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |  |  |  | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2 | -100 | -104 | -100 |
| *Noc*Note2 | | dBm/SCS | 1, 2 | -97 | -101 | -97 |
| Ês/Noc | | dB | 1, 2 | 12 | 0 | -4 |
| Ês/IotNote3 | | dB | 1, 2 | 12 | 0 | -4 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2 | -85 | -101 | -101 |
| IoNote3 | | dBm/38.16 MHz | 1, 2 | -53.68 | -66.9448 | -64.49 |
| Propagation condition | |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2 | 1x2 Low | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

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

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

##### A.11.2.1.7.2 Test Requirements

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

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

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

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

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

This gives a total of 85 ms.

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

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

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

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

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | NR cell on a carrier under CCA |
| Neighbouring cell |  | Cell 2 | E-UTRAN cell |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| T1 | | s | ≤5 |  |
| T2 | | s | 1 |  |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Configuration** | **Cell 1** | |
| **T1** | **T2** |
| RF channel number | |  | 1, 2 | 1 | |
| TDD Configuration | |  | 1, 2 | TDDConf.1.1.CCA | |
| BWchannel | | MHz | 1, 2 | 40: NRB,c = 106 (TDD) | |
| PDSCH reference measurement channel | |  | 1, 2 | SR.1.1 CCA | |
| CORESET reference channel | |  | 1, 2 | TBD | |
| TRS configuration | |  | 1, 2 | TRS.1.2 TDD | |
| OCNG patternNote1 | |  | 1, 2 | OP.1 | |
| BWP | Initial DL BWP |  | 1, 2 | DLBWP.0.1 | |
| Dedicated DL BWP | DLBWP.1.1 | |
| Initial UL BWP | ULBWP.0.1 | |
| Dedicated UL BWP | ULBWP.1.1 | |
| SMTC configuration | |  | 1, 2 | SMTC.1 | |
| DBT window configuration | |  | 1, 2 | As defined in A.3.21.1 | |
| SSB configuration | |  | 1, 2 | SSB.1 CCA for semi-static channel access;  SSB.2 CCA for dynamic channel access; | |
| EPRE ratio of PSS to SSS | | dB | 1, 2 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSS | |
| EPRE ratio of OCNG to OCNG DMRS | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2 | -98 | |
| *Noc*Note2 | | dBm/SCS | 1, 2 | -95 | |
| Ês/Noc | | dB | 1, 2 | 0 | 0 |
| Ês/IotNote3 | | dB | 1, 2 | 0 | 0 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2 | -95 | -95 |
| IoNote3 | | dBm/38.16 MHz | 1, 2 | -60.94 | -60.94 |
| Propagation condition | |  | 1, 2 | AWGN | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2 | 1x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

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

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

##### A.11.2.1.8.2 Test Requirements

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

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

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

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

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

This gives a total of 165 ms.

### A.11.2.2 RRC connection mobility control

#### A.11.2.2.1 RRC re-establishment

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

A.11.2.2.1.1.1 Test Purpose and Environment

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial Condition | Active cell | - | Cell1 | Cell 1 is with CCA. |
|  | Neighbour cells | - | Cell2 | Cell 2 is with CCA. |
| Final condition | Active cell | - | Cell2 |  |
| RF Channel Number | | - | 1 |  |
| DL CCA model | Dynamic channel access | - | As specified in clause A.3.20.2.1 |  |
|  | Semi-static channel access | - |  |  |
| UL CCA model | Dynamic channel access | - | As specified in clause A.3.20.2.2 |  |
|  | Semi-static channel access | - |  |  |
| Time offset between cells | | - | 3 μs | Synchronous cells |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| SSB configuration | Dynamic channel access | - | SSB.2 CCA | Table A.3.10A.1.2-1 |
|  | Semi-static channel access | - | SSB.1 CCA | Table A.3.10A.1.1-1 |
| DBT window configuration | | - | [DBT.1] | Table A.3.21.1-1 |
| SMTC configuration | | - | SMTC pattern 1 |  |
| DRX cycle length | | s | OFF |  |
| PRACH configuration | | - | [TBD] |  |
| T1 | | s | [5] |  |
| T2 | | ms | [200] | Time for the UE to detect RLF |
| T3 | | s | [2] |  |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | | **Cell 2** | | | | |
| **T1** | | **T2** | | **T3** | **T1** | **T2** | | | **T3** |
| TDD configuration | - | TDDConf.1.1 CCA | | | | | TDDConf.1.1 CCA | | | | |
| DL CCA probability PCCA\_DL | % | TBD | | | | | TBD | | | | |
| UL CCA probability PCCA\_UL | % | TBD | | | | | TBD | | | | |
| PDSCH RMC configuration |  | SR.1.1 CCA | | | | | SR.1.1 CCA | | | | |
| RMSI CORESET RMC configuration |  | CR.1.1 CCA | | | | | CR.1.1 CCA | | | | |
| Dedicated CORESET RMC configuration |  | CCR.1.1 CCA | | | | | CCR.1.1 CCA | | | | |
| OCNG Pattern |  | OP.1 defined in A.3.2.1 | | | | | OP.1 defined in A.3.2.1 | | | | |
| TRS configuration |  | TRS.1.2 TDD | | | | | N/A | | | | |
| Initial DL BWP configuration |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration |  | DLBWP.1.1 | N/A | | N/A | | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | ULBWP.1.1 | N/A | | N/A | | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | SSB | | | | | SSB | | | | |
|  | dB | 1.54 | | -infinity | | -infinity | -3.79 | 4 | | | 4 |
| Note2 | dBm/SCS | [-101] | | | | | | | | | |
| Note2 | dBm/15 kHz | [-104] | | | | | | | | | |
|  | dB | 7 | | -infinity | | -infinity | 4 | 4 | | | 4 |
| SS-RSRP Note3 | dBm/SCS | -88 | | -infinity | | -infinity | -91 | -91 | | | -91 |
| Io | dBm/9.36 MHz | -54.65 | | -58.50 | | -58.50 | -54.65 | -58.50 | | | -58.50 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

A.11.2.2.1.1.2 Test Requirements

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

The RRC re-establishment delay to a known NR intra frequency cell with CCA shall be less than TBD 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:

Where:

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

Where

Nfreq = 1

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

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

TSMTC is the SMTC periodicity.

Tidentify\_inter\_NR\_CCA = 0 ms

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

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

- TSSB,RO is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39].

[- K3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. K3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [57].]

This gives a total of TBD ms.

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

A.11.2.2.1.2.1 Test Purpose and Environment

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

The test parameters are given in table A.11.2.2.1.2.1-1, table A.11.2.2.1.2.1-2 and table A.11.2.2.1.2.1-3 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 with CCA, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

**Table A.11.2.2.1.2.1-1: Supported test configurations**

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

**Table A.11.2.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial Condition | Active cell | - | Cell1 | Cell 1 is with CCA. |
|  | Neighbour cells | - | Cell2 | Cell 2 is with CCA. |
| Final condition | Active cell | - | Cell2 |  |
| RF Channel Number | | - | 1 |  |
| DL CCA model | Dynamic channel access | - | As specified in clause A.3.20.2.1 |  |
|  | Semi-static channel access | - |  |  |
| UL CCA model | Dynamic channel access | - | As specified in clause A.3.20.2.2 |  |
|  | Semi-static channel access | - |  |  |
| Time offset between cells | | - | 3 μs | Synchronous cells |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| SSB configuration | Dynamic channel access | - | SSB.2 CCA | Table A.3.10A.1.2-1 |
|  | Semi-static channel access | - | SSB.1 CCA | Table A.3.10A.1.1-1 |
| DBT window configuration | | - | [DBT.1] | Table A.3.21.1-1 |
| SMTC configuration | | - | SMTC pattern 1 |  |
| DRX cycle length | | s | OFF |  |
| PRACH configuration | | - | [TBD] |  |
| T1 | | s | [5] |  |
| T2 | | ms | [200] | Time for the UE to detect RLF |
| T3 | | s | [2] |  |

**Table A.11.2.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | | **Cell 2** | | | | |
| **T1** | | **T2** | | **T3** | **T1** | **T2** | | | **T3** |
| TDD configuration |  | TDDConf.1.1 CCA | | | | | TDDConf.1.1 CCA | | | | |
| DL CCA probability PCCA\_DL |  | TBD | | | | | TBD | | | | |
| UL CCA probability PCCA\_UL |  | TBD | | | | | TBD | | | | |
| PDSCH RMC configuration |  | SR.1.1 CCA | | | | | SR.1.1 CCA | | | | |
| RMSI CORESET RMC configuration |  | CR.1.1 CCA | | | | | CR.1.1 CCA | | | | |
| Dedicated CORESET RMC configuration |  | CCR.1.1 CCA | | | | | CCR.1.1 CCA | | | | |
| OCNG Pattern |  | OP.1 defined in A.3.2.1 | | | | | OP.1 defined in A.3.2.1 | | | | |
| TRS configuration |  | TRS.1.2 TDD | | | | | N/A | | | | |
| Initial DL BWP configuration |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration |  | DLBWP.1.1 | N/A | | N/A | | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | ULBWP.1.1 | N/A | | N/A | | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | SSB | | | | | SSB | | | | |
|  | dB | 1.54 | | -infinity | | -infinity | -3.79 | 4 | | | 4 |
| Note2 | dBm/SCS | [-101] | | | | | | | | | |
| Note2 | dBm/15 kHz | [-104] | | | | | | | | | |
|  | dB | 7 | | -infinity | | -infinity | 4 | 4 | | | 4 |
| SS-RSRP Note3 | dBm/SCS | -88 | | -infinity | | -infinity | -91 | -91 | | | -91 |
| Io | dBm/9.36 MHz | -54.65 | | -58.50 | | -58.50 | -54.65 | -58.50 | | | -58.50 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

A.11.2.2.1.2.2 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 TBD 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:

Where:

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

Where

Tidentify\_intra\_NR\_CCA: 0 ms

Tidentify\_inter\_NR\_CCA,i: MAX (200 ms, ([6]+K2,i) x TSMTC, i),

where

K2,i is the number of SMTC not available at the UE during RRC re-establishment period on the “i” th carrier with CCA

TSMTC,i: It is the periodicity of the SMTC occasion configured for the inter-frequency carrier *i*.

Nfreq = 2

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

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

- TSSB,RO is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39].

[- K3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. K3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [57].]

This gives a total of TBD ms.

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

A.11.2.2.1.3.1 Test Purpose and Environment

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial Condition | Active cell | - | Cell1 | Cell 1 is with CCA. |
|  | Neighbour cells | - | Cell2 | Cell 2 is with CCA. |
| Final condition | Active cell | - | Cell2 |  |
| RF Channel Number | | - | 1 |  |
| DL CCA model | Dynamic channel access | - | As specified in clause A.3.20.2.1 |  |
|  | Semi-static channel access | - |  |  |
| UL CCA model | Dynamic channel access | - | As specified in clause A.3.20.2.2 |  |
|  | Semi-static channel access | - |  |  |
| Time offset between cells | | - | 3 μs | Synchronous cells |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| SSB configuration | Dynamic channel access | - | SSB.2 CCA | Table A.3.10A.1.2-1 |
|  | Semi-static channel access | - | SSB.1 CCA | Table A.3.10A.1.1-1 |
| DBT window configuration | | - | [DBT.1] | Table A.3.21.1-1 |
| SMTC configuration | | - | SMTC pattern 1 |  |
| DRX cycle length | | s | OFF |  |
| PRACH configuration | | - | [TBD] |  |
| T1 | | s | [5] |  |
| T2 | | ms | [6] | Time for the UE to detect RLF |
| T3 | | s | [3] |  |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | | **Cell 2** | | | | |
| **T1** | | **T2** | | **T3** | **T1** | **T2** | | | **T3** |
| TDD configuration |  | TDDConf.1.1 CCA | | | | | TDDConf.1.1 CCA | | | | |
| DL CCA probability PCCA\_DL | % | TBD | | | | | TBD | | | | |
| UL CCA probability PCCA\_UL | % | TBD | | | | | TBD | | | | |
| PDSCH RMC configuration |  | SR.1.1 CCA | | | | | SR.1.1 CCA | | | | |
| RMSI CORESET RMC configuration |  | CR.1.1 CCA | | | | | CR.1.1 CCA | | | | |
| Dedicated CORESET RMC configuration |  | CCR.1.1 CCA | | | | | CCR.1.1 CCA | | | | |
| OCNG Pattern |  | OP.1 defined in A.3.2.1 | | | | | OP.1 defined in A.3.2.1 | | | | |
| TRS configuration |  | TRS.1.2 TDD | | | | | N/A | | | | |
| Initial DL BWP configuration |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Initial UL BWP configuration |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Active DL BWP confgiuration |  | DLBWP.1.1 | N/A | | N/A | | N/A | | N/A | DLBWP.1.1 | |
| Active UL BWP configuration |  | ULBWP.1.1 | N/A | | N/A | | N/A | | N/A | ULBWP.1.1 | |
| RLM-RS |  | SSB | | | | | SSB | | | | |
|  | dB | 4 | | -infinity | | -infinity | -infinity | -infinity | | | 4 |
| Note2 | dBm/SCS | [-101] | | | | | | | | | |
| Note2 | dBm/15 kHz | [-104] | | | | | | | | | |
|
|  | dB | 7 | | -infinity | | -infinity | 4 | 4 | | | 4 |
| SS-RSRP Note3 | dBm/SCS | -91 | | -infinity | | -infinity | -infinity | -infinity | | | -91 |
| Io | dBm/9.36 MHz | -58.50 | | -infinity | | -infinity | -infinity | -infinity | | | -58.50 |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

A.11.2.2.1.3.2 Test Requirements

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

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than TBD 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:

Where:

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

Where,

Nfreq = 1

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

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

TSMTC is the SMTC periodicity.

Tidentify\_inter\_NR\_CCA = 0 ms

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

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

- TSSB,RO is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39].

[- K3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. K3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [57].]

This gives a total of TBD ms.

#### A.11.2.2.2 Random Access

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

###### A.11.2.2.2.1.1 Test Purpose and Environment

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

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Test-1 | Comments |
| SSB Configuration | Note 5 | | | Config 1 |  | SSB.3 CCA | As defined in A.3.10A |
|  | Note 6 | | | Config 1 |  | SSB.4 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1 |  | [DBT.1] | As specifeind in A.3.21.1 |
| DL CCA model | | | | Config 1 |  | As specifed in A.3.20.2.1 |  |
| UL CCA model | | | | Config 1 |  | As specifed in A.3.20.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1 |  | TDD |  |
| TDD Configuration | | | | Config 1 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | | | Config 1 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power (PCMAX,f,c) | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | | | |  | FR1 PRACH configuration 1 | As defined in A.3.8. |
| DL CCA probability | | | Note 5 | |  | TBD |  |
| PCCA\_DL | | | Note 6 | |  | TBD |  |
| UL CCA probability | | | Note 5 | |  | TBD |  |
| PCCA\_UL | | | Note 6 | |  | TBD |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: Void  Note 4: 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 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. | | | | | | | |

###### A.11.2.2.2.1.2 Test Requirements

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

A.11.2.2.2.1.2.1 Random Access Preamble Transmission

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

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

* The system simulator shall implement the UL CCA model of A.3.20.2 for the RACH occasions where PRACH transmissions are expected. The system simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.
* In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.
* In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.11.2.2.2.1.2.2 Random Access Response Reception

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

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.11.2.2.2.1.2.3 No Random Access Response Reception

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.11.2.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

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

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

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

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

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

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

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

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

A.11.2.2.2.1.2.7 Contention Resolution Timer expiry

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

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

##### A.11.2.2.2.2 Non-contention based random access for NR PSCell

###### A.11.2.2.2.2.1 Test Purpose and Environment

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

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Test-1 | Comments |
| SSB Configuration | Note 5 | | | Config 1 |  | SSB.3 CCA | As defined in A.3.10A |
|  | Note 6 | | | Config 1 |  | SSB.4 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1 |  | [DBT.1] | As specifeind in A.3.21.1 |
| DL CCA model | | | | Config 1 |  | As specifed in A.3.20.2.1 |  |
| UL CCA model | | | | Config 1 |  | As specifed in A.3.20.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1 |  | TDD |  |
| TDD Configuration | | | | Config 1 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | | | Config 1 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |  |
|  | |  | | | dB | 3 |  |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -95 |  |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |  |
|  | |  | | | dB | -17 |  |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -115 |  |
| Io Note 2 | | | | Config 1 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| PRACH Configuration | | | | |  | FR1 PRACH configuration 2 | As defined in A.3.8.2. |
| DL CCA probability | | | Note 5 | |  | TBD |  |
| PCCA\_DL | | | Note 6 | |  | TBD |  |
| UL CCA probability | | | Note 5 | |  | TBD |  |
| PCCA\_UL | | | Note 6 | |  | TBD |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: Void  Note 4: 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 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. | | | | | | | |

###### A.11.2.2.2.2.2 Test Requirements

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

A.11.2.2.2.2.2.1 SSB-based Random Access Preamble Transmission

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

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

* The system simulator shall implement the UL CCA model of A.3.20.2 for the RACH occasions where PRACH transmissions are expected. The system simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.
* In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.
* In case of UL CCA failure The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.11.2.2.2.2.2.2 Random Access Response Reception

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

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.11.2.2.2.2.2.3 No Random Access Response Reception

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

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

###### A.11.2.2.2.3.1 Test Purpose and Environment

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

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Test-1 | Comments |
| SSB Configuration | Note 4 | | | Config 1 |  | SSB.3 CCA | As defined in A.3.10A |
|  | Note 5 | | | Config 1 |  | SSB.4 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1 |  | [DBT.1] | As specifeind in A.3.21.1 |
| DL CCA model | | | | Config 1 |  | As specifed in A.3.20.2.1 |  |
| UL CCA model | | | | Config 1 |  | As specifed in A.3.20.2.2 |  |
| Duplex Mode for Cell 2 | | | | Config 1 |  | TDD |  |
| TDD Configuration | | | | Config 2 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | | | Config 1 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |
|  | |  | | | dB | 3 |
|  | | SS-RSRP | | | dBm/ SCS | -95 |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |
|  | |  | | | dB | -17 |
|  | | SS-RSRP | | | dBm/ SCS | -115 |
| Io Note 2 | | | | Config 1 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power (PCMAX,f,c) | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | | | |  | FR1 MsgA configuration 1 | As defined in A.3.20.2.1. |
| *msgA-RSRP-ThresholdSSB* | | | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| DL CCA probability | | | Note 4 | |  | TBD |  |
| PCCA\_DL | | | Note 5 | |  | TBD |  |
| UL CCA probability | | | Note 4 | |  | TBD |  |
| PCCA\_UL | | | Note 5 | |  | TBD |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. | | | | | | | |

###### A.11.2.2.2.3.2 Test Requirements

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

A.11.2.2.2.3.2.1 MsgA Transmission

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

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

* The system simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The system simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.
* In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

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

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble transmission shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.11.2.2.2.3.2.2 MsgB Reception

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

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

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

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

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.11.2.2.2.3.2.3 No MsgB Reception

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

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

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

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

###### A.11.2.2.2.4.1 Test Purpose and Environment

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

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Test-1 | Comments |
| SSB Configuration | Note 4 | | | Config 1 |  | SSB.3 CCA | As defined in A.3.10A |
|  | Note 5 | | | Config 1 |  | SSB.4 CCA | As defined in A.3.10A |
| DBT Window Configuration | | | | Config 1 |  | [DBT.1] | As specifeind in A.3.21.1 |
| DL CCA model | | | | Config 1 |  | As specifed in A.3.20.2.1 |  |
| UL CCA model | | | | Config 1 |  | As specifed in A.3.20.2.2 |  |
| Duplex Mode for Cell 1 | | | | Config 1 |  | TDD |  |
| TDD Configuration | | | | Config 1 |  | TDDConf.1.1 CCA |  |
| OCNG Pattern Note 1 | | | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | | | Config 1 |  | SR.1.1 CCA | As defined in A.3.1A.1. |
| NR RF Channel Number | | | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | | | dB |  |  |
| msgA-*RSRP-ThresholdSSB* | | | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| SSB with index 0 | |  | | | dB | 3 | Power of SSB with index 0 is set to be above configured msgA-*RSRP-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |
|  | |  | | | dB | 3 |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -95 |
| SSB with index 1 | |  | | | dB | -17 | Power of SSB with index 1 is set to be below configured msgA-*RSRP-ThresholdSSB* |
|  | |  | | Config 1 | dBm/15kHz | -101 |
|  | |  | | | dB | -17 |
|  | | SS-RSRP Note 3 | | | dBm/ SCS | -115 |
| Io Note 2 | | | | Config 1 | dBm | -62.2/38.16MHz | For symbols without SSB index 1 |
| ss-PBCH-BlockPower | | | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | | | |  | FR1 MsgA configuration 2 | As defined in A.3.20.2.2. |
| DL CCA probability | | | Note 4 | |  | TBD |  |
| PCCA\_DL | | | Note 5 | |  | TBD |  |
| UL CCA probability | | | Note 4 | |  | TBD |  |
| PCCA\_UL | | | Note 5 | |  | TBD |  |
| Propagation Condition | | | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. | | | | | | | |

###### A.11.2.2.2.4.2 Test Requirements

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

A.11.2.2.2.4.2.1 MsgA Transmission

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

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

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

* The system simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The system simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.
* In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.
* The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.11.2.2.2.4.2.2 MsgB Reception

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

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

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

The system simulator shall implement the UL CCA model of A.3.20.2 for the MsgA occasions where MsgA transmissions are expected. The system simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on a MsgA occasion that is expected to have UL CCA failure, the test is considered as failed.

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

A.11.2.2.2.4.2.3 No MsgB Reception

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

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

The system simulator shall implement the UL CCA model of A.3.20.2 for the MsgA occasions where MsgA transmissions are expected. The system simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on a MsgA occasion that is expected to have UL CCA failure, the test is considered as failed.

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

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

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

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

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

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

A.11.2.2.3.1.1 Test Purpose and Environment

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

A.11.2.2.3.1.2 Test Parameters

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 | On the carrier under CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≥ Tconnection\_release\_redirect\_NR\_CCA | Tconnection\_release\_redirect\_NR\_CCA ­is defined in clause 6.2.3.2.3 |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 2 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 2 | | |
| CCA model | | |  | TBD | | | | TBD | | |
| PCCA\_DL | | |  | [TBD] | | | | [TBD] | | |
| PCCA\_UL | | |  | [TBD] | | | | [TBD] | | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | | | | | | |
| BWchannel | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| BWP BW | | Config 1 |  | 40: NRB,c = 106 | | | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference | | Config 1 |  | SR.1.1 CCA | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 CCA | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.2 TDD | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | |
| DBT configuration | | |  | DBT.1 | | | | | | |
| SSB configuration for semi-static channel access | | Config 1 |  | SSB.1 CCA | | | | | | |
| SSB configuration for dynamic channel access | | Config 1 |  | SSB.2 CCA | | | | | | |
| ssb-PositionQCL | | Config 1 |  | [1] | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1 | kHz | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | |
| Note2 | Config 1 | | dBm/SCS | -95 | | | | | | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
|  | | | dB | 4 | 4 | | -infinity | | 4 | |
| IoNote3 | Config 1 | | dBm/  38.16MHz | -58.49 | -58.49 | | -63.94 | | -58.49 | |
| Propagation condition | | | - | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | |

A.11.2.2.3.1.3 Test Requirements

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

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

NOTE: The redirection delay can be expressed as:

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

where:

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

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

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

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

L1 is the number of SMTC occasions not available at the UE due to DL CCA failures.

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

A.11.2.2.3.2.1 Test Purpose and Environment

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

A.11.2.2.3.2.2 Test Parameters

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

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 | On the carrier without CCA |
|  | Neighbouring cell |  | Cell 2 | On the carrier under CCA |
| Final condition | Active cell |  | Cell 2 | On the carrier under CCA |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** | | **Cell 2** | | |
|  | | |  | **T1** | **T2** | **T1** | | **T2** |
| NR RF Channel Number | | |  | 1 | | 2 | | |
| DL CCA probability (PCCA\_DL) | | |  | N/A | | TBD | TBD | |
| UL CCA probability (PCCA\_UL) | | |  | N/A | | TBD | TBD | |
| Duplex mode | | Config 1 |  | FDD | | TDD | | |
|  | | Config 2,3 |  | TDD | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | TDDConf.1.1 CCA | | |
|  | | Config 2 |  | TDDConf.1.1 | | TDDConf.1.1 CCA | | |
|  | | Config 3 |  | TDDConf.2.1 | | TDDConf.1.1 CCA | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | 40: NRB,c = 106 | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | |
| DRX Cycle | | | ms | Not Applicable | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | SR.1.1 CCA | | |
| Config 2 |  | SR.1.1 TDD | | SR.1.1 CCA | | |
| Config 3 |  | SR2.1 TDD | | SR.1.1 CCA | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | CR.1.1 CCA | | |
| Config 2 |  | CR.1.1 TDD | | CR.1.1 CCA | | |
| Config 3 |  | CR2.1 TDD | | CR.1.1 CCA | | |
| OCNG Patterns | | |  | OCNG pattern 1 | | | | |
| SSB Configuration | Semi-static channel acces | Config 1,2 |  | SSB.1 FR1 | | SSB.1 CCA | | |
| Dymamic channel acces | Config 3 |  | SSB.2 FR1 | | SSB.2 CCA | | |
| Semi-static channel acces | Config 1,2 |  | SSB.1 FR1 | | SSB.1 CCA | | |
| Dymamic channel acces | Config 3 |  | SSB.2 FR1 | | SSB.2 CCA | | |
| SMTC configuration | | Config 1,2 |  | SMTC.1 FR1 | | SMTC.2 FR1 | | |
|  | | Config 3 |  | SMTC.2 FR1 | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | 30 kHz | | |
| Config 3 |  | 30 kHz | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | 30 kHz | | |
| Config 3 |  | 30 kHz | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | | | dBm/15kHz | -98 | | | | |
| Note2 | | Config 1,2 | dBm/SCS | -98 | | -95 | | |
| Config 3 |  | -95 | | | | |
|  | | | dB | 4 | 4 | -infinity | | 4 |
|  | | | dB | 4 | 4 | -infinity | | 4 |
| IoNote3 | | Config 1,2 | dBm/9.36MHz | -64.59 | -64.59 | N/A | | N/A |
| Config 3 | dBm/38.16MHz | -58.49 | -58.49 | -63.94 | | -58.49 |
| Propagation condition | | | - | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

A.11.2.2.3.2.3 Test Requirements

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

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

NOTE: The redirection delay can be expressed as:

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

where:

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

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

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

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

L1 is the number of SMTC occasions not available at the UE due to DL CCA failures, and L2 is the consecutive number of SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failures. L2 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [33].

## A.11.3 Timing

### A.11.3.1 UE transmit timing

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

A.11.3.1.1.1 Test Purpose and environment

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

Supported test configurations are shown in Table 11.3.1.1.1-1

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

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Configuration** | **Test1** | **Test2** |
| SSB ARFCN |  | 1 | 1 | 1 |
| TDD configuration |  | 1 | TBD | |
| BWchannel | MHz | 1 | 40: NRB,c = 106 | |
| Initial BWP Configuration |  | 1 | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP Configuration |  | 1 | DLBWP.1.1  ULBWP.1.1 | |
| DRX Cycle | ms | 1 | N/A | DRX.8Note5 |
| DL CCA model |  | 1 | As specified in clause A.3.20.2.1 | |
| UL CCA model |  | 1 | As specified in clause A.3.20.2.2 | |
| PDSCH Reference measurement channel |  | 1 | TBD | |
| RMSI CORESET Reference Channel |  | 1 | TBD | |
| Dedicated CORESET Reference Channel |  | 1 | TBD | |
| OCNG Patterns |  | 1 | OP.1 | |
| SSB configuration |  | 1 | TBD | |
| SMTC Configuration |  | 1 | TBD | |
| DBT window configuration |  | 1 | TBD | |
| TRS configuration |  | 1 | TBD | |
| DL CCA probability PCCA |  | 1 | TBD | TBD |
| UL CCA probability PCCA |  | 1 | TBD | TBD |
| EPRE ratio of PSS to SSS | dB | 1 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| Note2 | dBm/30 KHz | 1 | -95 | -95 |
|  |  | 1 | 3 | 3 |
|  |  | 1 | 3 | 3 |
| SS-RSRPNote3 | dBm/30 kHz | 1 | -92 | -92 |
| IoNote3 | dBm/38.1MHz | 1 | -59.2 | -59.2 |
| Propagation condition |  | 1 | AWGN | |
| SRS Config |  | 1 | SRSConf.1Note6 | SRSConf.2Note6 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: DRX related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.11.3.1.1.1-3 | | | | |

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

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

A.11.3.1.1.2 Test requirements

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

Following will be the test sequence for this test

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

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

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

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

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

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

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

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

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

### A.11.3.2 UE timing advance

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

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

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

##### A.11.3.2.1.2 Test Parameters

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

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

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

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

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

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

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

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test1 | |
|  | |  | T1 | T2 |
| TDD configuration | Config 1 |  | TBD | |
| BWchannel | Config 1 | MHz | 40: NRB,c = 106 | |
| BWP BW | Config 1 | MHz | 40: NRB,c = 106 | |
| DRX Cycle | Config 1 | ms | Not Applicable | |
| DL CCA model | Config 1 |  | As specified in clause A.3.20.2.1 | |
| UL CCA model | Config 1 |  | As specified in clause A.3.20.2.2 | |
| PDSCH Reference measurement channel | Config 1 |  | TBD | |
| CORESET Reference Channel | Config 1 |  | TBD | |
| TRS configuration | Config 1 |  | TBD | |
| OCNG Patterns | Config 1 |  | OCNG pattern 1 | |
| SMTC configuration | Config 1 |  | TBD | |
| SSB configuration | Config 1 |  | TBD | |
| DL CCA probability PCCA | Config 1 |  | TBD | |
| UL CCA probability PCCA | Config 1 |  | TBD | |
| EPRE ratio of PSS to SSS | | dB | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  | |
| Note2 | Config 1 | dBm/30 kHz | -95 | |
|  | | dB | 3 | |
|  | | dB | 3 | |
| IoNote3 | Config 1 | dBm/  38.16MHz | -62.58 | |
| Propagation condition | | - | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

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

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

##### A.11.3.2.1.3 Test Requirements

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

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

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

## A.11.4 Signalling characteristics

### A.11.4.1 Radio link monitoring

#### A.11.4.1.1 Introduction

In the test cases specified in clause A.11.4.1, 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 based on the UE output power:

* 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.

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.

#### A.11.4.1.2 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode

##### A.11.4.1.2.1 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 PCell radio link monitoring requirements in clause 8.1A.

In the test, UE is configured to perform RLM based 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.11.4.1.2.1-1. The test parameters are given in Tables A.11.4.1.2.1-2, A.11.4.1.2.1-3, and A.11.4.1.2.1-4 below. There is one cell (Cell 1), which is the active NR cell in FR1, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

The test consists of three successive time periods, with time duration of T1, T2 and T3, respectively. Figure A.11.4.1.2.1-1 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. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE transmits according to UL CCA model. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40 ms) in the test.

Table A.11.4.1.2.1-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.4.1.2.1-2: General test parameters for PCell out-of-sync testing in non-DRX mode.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value |
| Test 1, Test 2 |
| Active PCell | | |  | Cell 1 |
| RF Channel Number | | |  | 1 |
| DL CCA model | | |  | As specified in clause A.3.20.2.1 |
| UL CCA model | | |  | As specified in clause A.3.20.2.2 |
| Duplex mode | | Config 1 |  | TDD |
| BWchannel | | Config 1 | MHz | 40: NRB,c = 106 |
| 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 |  | TBD |
| CORESET Reference Channel | | Config 1 |  | TBD |
| SSB configuration | | Config 1 |  | TBD |
| DBT window configuration | | Config 1 |  | TBD |
| PDSCH/PDCCH subcarrier spacing | | Config 1 |  | 30 kHz |
| PRACH Configuration | | Config 1 |  | TBD |
| 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 | TBD |
| T311 timer | | | ms | TBD |
| N310 | | |  | TBD |
| N311 | | |  | TBD |
| CSI-RS configuration for CSI reporting | | Config 1 |  | [CSI-RS.2.1 TDD] |
| CSI-RS for tracking | | Config 1 |  | [TRS.1.2 TDD] |
| T1 | | | s | TBD |
| T2 | | | s | TBD |
| T3 | | | s | TBD |
| D1 | | | s | TBD |
| 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.11.4.1.2.1-3: Cell-specific test parameters for PCell out-of-sync testing in non-DRX mode.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | Test 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| DL CCA probability PCCA\_DL | | Note 6,8 |  | TBD | | | TBD | | |
| Note 7,8 |
| UL CCA probability PCCA\_UL | | |  | TBD | | | TBD | | |
| EPRE ratio of PDCCH DMRS to SSS | | | dB | 4 | | | 4 | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | | | dB | 0 | | | 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 |
| SNRNote 3,4 on RLM-RS | Config 1 | | dB | 1 | [-7] | -15 | 1 | TBD | TBD |
| SNR on other channels and signals | Config 1 | | dB | 1 | | | 1 | | |
|  | Config 1 | | dBm/SCS | -95 | | | -95 | | |
| Propagation condition | | |  | TDL-C 300 ns 100 Hz | | | TDL-C 300 ns 100 Hz | | |
| 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. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  NOTE 2: 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 transmitted SSS REs during DBT windows.  NOTE 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3, respectively, in Figure A.10.3.1.2.1-1.  NOTE 5: The SNR values are specified for testing a UE which supports 2 RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 is A.3.6.  NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  NOTE 8: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | | |

Table A.11.4.1.2.1-4: Measurement gap configuration for PCell out-of-sync testing in non-DRX mode.

|  |  |  |
| --- | --- | --- |
| Field | Test 1 | Test 2 |
| Value | Value |
| *gapOffset* | 0 | 0 |
| NOTE: Ensure that RLM RS is partially overlapped with measurement gap0 | | |

****

**Figure A.11.4.1.2.1-1: SNR variation for out-of-sync testing.**

##### A.11.4.1.2.2 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).

In Test 1, the UE is verified to meet the out-of-sync requirement for RLM-RS SSB Es/Iot <-7 dB.

In Test 2, the UE is verified to meet the out-of-sync requirement for RLM-RS SSB Es/Iot ≥-7 dB.

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

#### A.11.4.1.3 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode

##### A.11.4.1.3.1 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. This test will partly verify the FR1 PCell radio link monitoring requirements in clause 8.1A.

In the test, UE is configured to perform RLM based 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.11.4.1.3.1-1. The test parameters are given in Tables A.11.4.1.3.1-2, and A.11.4.1.3.1-3 below. There is one cell (Cell 1), which is the active NR cell in FR1, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5, respectively. Figure A.11.4.1.3.1-1 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. 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 transmits according to UL CCA model.

Table A.11.4.1.3.1-1: Supported test configurations.

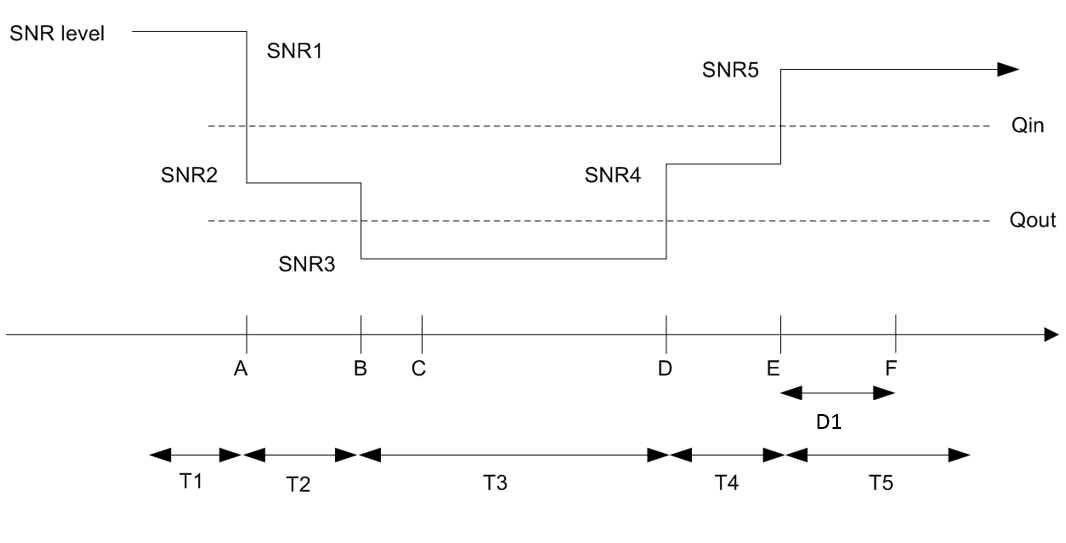
|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |

Table A.11.4.1.3.1-2: General test parameters for PCell in-sync testing in non-DRX mode.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Value |
| Test 1 |
| Active PCell | | | |  | Cell 1 |
| RF Channel Number | | | |  | 1 |
| DL CCA model | | | |  | As specified in clause A.3.20.2.1 |
| UL CCA model | | | |  | As specified in clause A.3.20.2.2 |
| Duplex mode | | | Config 1 |  | TDD |
| BWchannel | | | Config 1 | MHz | 40: NRB,c = 106 |
| 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 |  | TBD |
| CORESET Reference Channel | | | Config 1 |  | TBD |
| SSB Configuration | | | Config 1 |  | TBD |
| DBT window configuration | | | Config 1 |  | TBD |
| PDSCH/PDCCH subcarrier spacing | | | Config 1 |  | 30 kHz |
| PRACH Configuration | | | Config 1 |  | TBD |
| 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 | TBD |
| T311 timer | | | | ms | TBD |
| N310 | | | |  | TBD |
| N311 | | | |  | TBD |
| CSI-RS configuration for CSI reporting | | Config 1 | |  | CSI-RS.2.1 TDD |
| CSI-RS for tracking | | Config 1 | |  | TRS.1.2 TDD |
| T1 | | | | s | TBD |
| T2 | | | | s | TBD |
| T3 | | | | s | TBD |
| T4 | | | | s | TBD |
| T5 | | | | s | TBD |
| D1 | | | | s | TBD |
| 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.11.4.1.3.1-3: Cell-specific test parameters for PCell in-sync testing in non-DRX mode.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
| T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA\_DL | |  | TBD | | | | |
| UL CCA probability PCCA\_UL | |  | TBD | | | | |
| 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] | [-4.5] | 1 |
| SNR on other channels and signals | Config 1 | dB | 1 | | | | |
|  | Config 1 | dBm/SCS | -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. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.  NOTE 2: 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 transmitted SSS REs during DBT windows.  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.11.4.1.3.1-1.  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 4 RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6. | | | | | | | |

****

**Figure A.11.4.1.3.1-1: SNR variation for in-sync testing.**

##### A.11.4.1.3.2 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.11.4.1.4 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in DRX mode

##### A.11.4.1.4.1 Test purpose and environment

##### A.11.4.1.4.2 Test requirements

#### A.11.4.1.5 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in DRX mode

##### A.11.4.1.5.1 Test purpose and environment

##### A.11.4.1.5.2 Test requirements

### A.11.4.2 Interruption

#### A.11.4.2.1 NR interruptions during Scell operations with CCA on PCell and SCell

##### A.11.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify NR PCell interruptions during Scell operations on an NR SCC with CCA, This test will verify the interruption requirements for NR PCell in NR SA specified in TS 38.133 clause 8.2.2 and 8.3A. Supported test configurations are shown in table A.11.4.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.11.4.2.1.1-2 and A.11.4.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 and Cell2 are PCell and SCell. Both of cell 1 and cell 2 are subject to CCA. The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the PCell are continuously scheduled in DL. The power of signals on cell 1 and 2 is not modified during the test.

Prior to T1, a connection is started with cell 1 as the PCell, and measurements of cell 2 are configured with gap pattern 0, such that cell 2 is reported. This ensures that cell 2 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying Scell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the Scell is configured.

The point in time at which the MAC-CE message implying Scell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying Scell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying Scell release is received at the UE antenna connector, defines the start of time period T5.

Table A.11.4.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

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

Table A.11.4.2.1.1-2: General test parameters for Interruptions during measurements on deactivated NR SCC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 |  |
| Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Configured dSCell |  | Cell2 | Deactivated SCell on NR RF channel number 2. |
| CP length |  | Normal | Applicable to Cell1, Cell2 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| T1 | s | <10 |  |
| T2 | s | <10 |  |
| T3 | s | <10 |  |
| T4 | s | <10 |  |
| T5 | s | <10 |  |

Table A.11.4.2.1.1-3: NR cell specific test parameters for Interruptions during measurements on deactivated NR SCC

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | | | | | Cell3 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| TDD configuration | Config 1 |  | TDDconf.2.1 | | | | | TDDConf.2.1 | | | | |
| LBT configuration | Config 1 |  | LBT enabled as described in section A.x with P=[0.75] | | | | | LBT enabled as described in section A.x with P=[0.75] | | | | |
| BWchannel | Config 1 | MHz | 40: NRB,c = 106 | | | | | 40: NRB,c = 106 | | | | |
| DL CCA model | Config 1 |  | As specified in clause A.3.20.2.1 | | | | | As specified in clause A.3.20.2.1 | | | | |
| DL CCA probability PCCA\_DL | Config 1 |  | TBD | | | | | TBD | | | | |
| UL CCA model | Config 1 |  | As specified in clause A.3.20.2.2 | | | | | --- | | | | |
| UL CCA probability PCCA\_UL | Config 1 |  | TBD | | | | | TBD | | | | |
| Initial BWP  Configuration | Config 1 |  | DLBWP.0.1 | | | | | DLBWP.0.1 | | | | |
| Dedicated DL BWP  Configuration | Config 1 |  | DLBWP.1.1 | | | | | DLBWP.1.1 | | | | |
| Initial UL BWP  Configuration | Config 1 |  | ULBWP.0.1 | | | | | ULBWP.0.1 | | | | |
| Dedicated UL BWP  Configuration | Config 1 |  | ULBWP.1.1 | | | | | ULBWP.1.1 | | | | |
| PDSCH reference meassurement channel | Config 1 |  | [SR.2.1 TDD] | | | | | --- | | | | |
| RMSI CORESET  parameters | Config 1 |  | [CR.2.1 TDD] | | | | | [CR.2.1 TDD] | | | | |
| PDCCH CORESET  parameters | Config 1 |  | [CCR.2.1 TDD] | | | | | [CCR.2.1 TDD] | | | | |
| TRS configuration | Config 1 |  | [TRS.1.2 TDD] | | | | | [TRS.1.2 TDD] | | | | |
| OCNG Patterns | |  | OP.1 | | | | | OP.1 | | | | |
| SSB configuration | Config 1 |  | TBD | | | | | TBD | | | | |
| SMTC Configuration | Config 1 |  | [SMTC.1] | | | | | [SMTC.1] | | | | |
| DBT window configuration | Config 1 |  | TBD | | | | | TBD | | | | |
| TCI state | |  | TCI.State.0 | | | | | TCI.State.0 | | | | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | | | | 1x2 Low | | | | |
| EPRE ratio of PSS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  | | | | |  | | | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | | | | | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  | | | | |  | | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  | | | | |  | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  | | | | |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  | | | | |  | | | | |
| NocNote 2 | | dBm/15 kHz | -104 | | | | | -104 | | | | |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | | | | | -87 | | | | |
| Ês/Iot | | dB | 17 | | | | | 17 | | | | |
| Ês/Noc | | dB | 17 | | | | | 17 | | | | |
| IoNote3 | Config 1 | dBm/38.16MHz | -52.86 | | | | | -52.86 | | | | |
| Time offset to Cell1 Note 4 | | ms | 3 | | | | | 3 | | | | |
| Time offset to Cell2 Note 5 | | μs | - | | | | | 3 | | | | |
| Propagation Condition | |  | AWGN | | | | | AWGN | | | | |
| Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. | | | | | | | | | | | | |

##### A.11.4.2.1.2 Test Requirements

The UE shall meet the interruption requirements for Scell addition on the victim Pcell in clause 8.2.1 during time T1

The UE shall meet the interruption requirements for Scell activation on the victim Pcell in clause 8.2.1during time T2. There shall be a single interruption with time window as specified in clause 8.3A.2

The UE shall meet the interruption requirements for Scell deactivation on the victim PCell in clause 8.2.1during time T3. There shall be a single interruption with time window as specified in clause 8.3A,3

The UE shall meet the interruption requirements for deactivated Scell measurements on the victim PCell in clause 8.2.1 during time T4. The interruptions shall be within the time window as specified in clause 8.3A,3

The UE shall meet the interruption requirements for Scell release on the victim PCell in clause 8.2.1during time T5.

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

### A.11.4.3 SCell activation and deactivation delay

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

A.11.4.3.1.1 Test Purpose and Environment

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

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

The test parameters are given in Table A.11.4.3.1.1-2 and cell-specific parameters in Table A.11.4.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in NR with CCA, and Cell2 (SCell) on radio channel 2 (SCC) in NR with CCA. Before the test starts the UE is connected to Cell 1, but is not aware of Cell 2, as the UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted *m*, defines the start of time period T2. The UE shall be able to report a valid CSI in PCell for the activated SCell at latest in slot *m* + (THARQ+Tactivation\_time\_withCCA + TCSI\_Reporting\_withCCA)/NR\_slot\_length, as defined in clause 8.3A.2. The UE shall start reporting CSI in PCell in first available uplink resource for CSI reporting following slot *m+* and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption shall fall within the time window specified in clause 8.3.2.

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

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

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received, while taking into account CCA failures on SCC.

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

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

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

Table A.11.4.3.1.1-2: General test parameters for known SCell activation with PCell and SCell under CCA, 160 ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two radio channels (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every second subframe |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ TAE as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | [7] | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | [1] | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.11.4.3.1.1-3: Cell specific test parameters for known SCell activation case with PCell and SCell under CCA, 160 ms SCell measurement cycle

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | | | Cell 2 | | | | |
| T1 | | T2 | | T3 | T1 | T2 | | T3 | |
| Duplex mode | Config 1 |  | TDD | | | | | TDD | | | | |
| TDD configuration | Config 1 |  | TDDConf.2.1 | | | | | TDDConf.2.1 | | | | |
| BWchannel | Config 1 | MHz | 40: NRB,c = 106 | | | | | 40: NRB,c = 106 | | | | |
| DL CCA model | |  | As specified in clause A.3.20.2.1 | | | | | As specified in clause A.3.20.2.1 | | | | |
| UL CCA model | |  | As specified in clause A.3.20.2.2 | | | | | --- | | | | |
| DL CCA probability PCCA\_DL | |  | TBD | TBD | | TBD | | TBD | | TBD | | TBD |
| UL CCA probability PCCA\_UL | |  | TBD | TBD | | TBD | | --- | | | | |
| Initial downlink BWP configuration | |  | DLBWP.0.2 | | | | | DLBWP.0.2 | | | | |
| Initial uplink BWP configuration | |  | ULBWP.0.1 | | | | | --- | | | | |
| Dedicated downlink BWP configuration | |  | DLBWP.0.2 | | | | | DLBWP.0.2 | | | | |
| Dedicated uplink BWP configuration | |  | ULBWP.0.1 | | | | | --- | | | | |
| TCI state | |  | TCI.State.0 | | | | | TCI.State.0 | | | | |
| TRS Configuration | Config 1 |  | [TRS.1.2 TDD] | | | | | [TRS.1.2 TDD] | | | | |
| PDSCH Reference measurement channel | Config 1 |  | [SR.2.1 TDD] | | | | | --- | | | | |
| Dedicated CORESET parameters | Config 1 |  | [CCR.2.1 TDD] | | | | | --- | | | | |
| RMSI CORESET parameters | Config 1 |  | [CR.2.1 TDD] | | | | | --- | | | | |
| OCNG Patterns Note1 | |  | OP.1 | | | | | OP.1 | | | | |
| SSB Configuration | Config 1 |  | [SSB.2 FR1] | | | | | [SSB.2 FR1] | | | | |
| SMTC configuration | |  | [SMTC.1] | | | | | SMTC.1 | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| *Noc* Note2 | Config 1 | dBm/15kHz | -104 | | | | | -104 | | | | |
| *Noc* Note2 | Config 1 | dBm/SCS | -101 | | | | | -101 | | | | |
| *Ês/Iot* | | dB | 17 | | | | | 17 | | | | |
| *Ês/Noc* | | dB | 17 | | | | | 17 | | | | |
| SS-RSRP Note3 | Config 1 | dBm/SCS | -84 | | | | | -84 | | | | |
| Propagation condition | | - | AWGN | | | | | | | | | |
| Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc*to be fulfilled.  Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. | | | | | | | | | | | | |

A.11.4.3.1.2 Test Requirements

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

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

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

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

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

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

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

A.11.4.3.2 SCell Activation and Deactivation of known SCell with PCell and SCell under CCA, 320 ms SCell measurement cycle

A.11.4.3.2.1 Test Purpose and Environment

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

The supported test configurations are same as in Table A.11.4.3.1.1-1 above.

The test parameters are same as in Table A.11.4.3.1.1-2 above, except for parameters listed below in Table A.11.4.3.2.1-1. The cell-specific parameters are same as in Table A.11.4.3.1.1-3 above.

The test execution is the same as described in clause A.11.4.3.1 above.

Table A.11.4.3.2.1-1: General test parameters for known SCell activation with PCell and SCell under CCA, 320 ms SCell measurement cycle

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

A.11.4.3.2.2 Test Requirements

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

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

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

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

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

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

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

A.11.4.3.3 SCell Activation and Deactivation of unknown SCell with PCell and SCell under CCA

A.11.4.3.3.1 Test Purpose and Environment

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

The supported test configurations are same as in Table A.11.4.3.1.1-1 above.

The test parameters are same as in Table A.11.4.3.1.1-2 above, except for parameters listed below in Table A.11.4.3.3.1-1. The cell-specific parameters are same as in Table A.11.4.3.1.1-3 above.

The test execution is the same as described in clause A.11.4.3.1 above.

Table A.11.4.3.3.1-1: General test parameters for unknown SCell activation with PCell ans SCell under CCA

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

A.11.4.3.3.2 Test Requirements

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

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

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

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

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

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

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

### A.11.4.4 Beam failure detection and link recovery procedures

#### A.11.4.4.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode

##### A.11.4.4.1.1 Test Purpose and Environment

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

The test parameters are given in Tables A.11.4.4.1.1-1, A.11.4.4.1.1-2, A.11.4.4.1.1-3 and A.11.4.4.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.11.4.4.1.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure A.11.4.4.1.1-1 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. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA mode. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40 ms) in test 1.

Table A.11.4.4.1.1-1: Supported test configurations for FR1 PCell with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 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.11.4.4.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Value |  | Comment |
|  | | | | |  | Test 1 | Test 2 |  |
| Active PSCell | | | | |  | Cell 1 | Cell 1 |  |
| RF Channel Number | | | | |  | 1 | 1 |  |
| DL CCA model | | | | |  | As specifieed in A.3.20.2.1 | As specifieed in A.3.20.2.1 |  |
| UL CCA model | | | | |  | As specified in A.3.20.2.2 | As specified in A.3.20.2.2 |  |
| Duplex mode | | | | Config 1 |  | TDD | TDD |  |
| BWchannel | | | | Config 1 | MHz | 40: NRB,c = 106 | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | | Config 1 |  | DLBWP.0.1 | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config |  | DLBWP.1.1 | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1 |  | ULBWP.0.1 | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1 |  | ULBWP.1.1 | ULBWP.1.1 |  |
| TDD Configuration | | | | Config 1 |  | TDDConf.1.1 CCA | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | | | Config 1 |  | CR.1.1 CCA | CR.1.1 CCA |  |
| SSB Configuration | | | | Config 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | | | Config 1 |  | DBT.1 | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1 |  | 30 KHz | 30 KHz |  |
| PRACH Configuration | | | | Config 1 |  | Table A.3.8.2.2-1 | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 | 1 |  |
| OCNG parameters | | | | |  | OP.1 | OP.1 |  |
| CP length | | | | |  | Normal | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low | 2x2 Low |  |
| Beam failure detection transmission parameters | | DCI format | | |  | 1-0 | 1-0 |  |
|  | | Number of Control OFDM symbols | | |  | 2 | 2 |  |
|  | | Aggregation level | | | CCE | 8 | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 0 | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 0 | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size | REG bundle size |  |
|  | | REG bundle size | | |  | 6 | 6 |  |
| DRX | | | | |  | OFF | OFF |  |
| Gap pattern ID | | | | |  | gp0 | gp0 |  |
| gapOffset | | | | |  | 0 | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1 | | | | dBm/SCS kHz | -95 | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | | | |  | db0 | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | | |  | pbfd4 | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for CSI reporting | | | Config 1 | |  | CSI-RS.2.1 TDD | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | | Config 1 | |  | TRS.1.2 TDD | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | |  | |  | 0, 1 | 0, 1 |  |
| T310 Timer | | |  | | ms | [1000] | [1000] |  |
| N310 | | |  | |  | [2] | [2] |  |
| T1 | | | | | s | [0.2] | [0.2] | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | [0.85] | [0.93] |  |
| T3 | | | | | s | [0.44] | [0.52] |  |
| T4 | | | | | s | [0] | [0] |  |
| T5 | | | | | s | [0.45] | [0.45] |  |
| D1 | | | | | s | [0.41] | [0.41] |  |
| 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.11.4.4.1.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA,DL | | Note 10, 12 |  | TBD | TBD | TBD | TBD | TBD |
|  | | Note 11, 12 |  | TBD | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA,UL | | |  | TBD | TBD | TBD | TBD | TBD |
| 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 |  | | | | |
| 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\_SSB of set q0 | Config 1 | | dB | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1 | | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | Config 1 | | dBm/15 KHz | -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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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 the transmitted SSS REs during DBT window.  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.3.6A].  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

Table A.11.4.4.1.1-4: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 2 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA | | Note 10, 12 |  | TBD | TBD | TBD | TBD | TBD |
|  | | Note 11, 12 |  | TBD | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA | | |  | TBD | TBD | TBD | TBD | TBD |
| 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 |  | | | | |
| 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\_SSB of set q0 | Config 1 | | dB | 5 | [-1] | [-7] | [-7] | [-7] |
| SNR\_SSB of set q1 | Config 1 | | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1 | | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | Config 1 | | dBm/15 KHz | -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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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 the transmitted SSS REs during DBT window.  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.3.6A].  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |



**Figure A.6.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.11.4.4.1.2 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 initiate 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 = [410] 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.

In Test 1, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot < -7 dB.

In Test 2, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot ≥ -7 dB.

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.11.4.4.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode

##### A.11.4.4.2.1 Test Purpose and Environment

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

The test parameters are given in Tables A.11.4.4.2.1-1, A.11.4.4.2.1-2, A.11.4.4.2.1-3 and A.11.4.4.2.1-4 below. There is one cell, cell 1 which is the active cell, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.11.4.4.2.1-1 shows the variation of the downlink SNR of the SSB in set q0 in the active cell to emulate SSB based beam failure. Figure A.11.4.4.2.1-1 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. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA mode. 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.

Table A.11.4.4.2.1-1: Supported test configurations for FR1 PCell with CCA

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 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.11.4.4.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | Unit | Value |  | Comment |
|  | | | | |  | Test 1 | Test 2 |  |
| Active PSCell | | | | |  | Cell 1 | Cell 1 |  |
| RF Channel Number | | | | |  | 1 | 1 |  |
| DL CCA model | | | | |  | As specifieed in A.3.20.2.1 | As specifieed in A.3.20.2.1 |  |
| UL CCA model | | | | |  | As specified in A.3.20.2.2 | As specified in A.3.20.2.2 |  |
| Duplex mode | | | | Config 1 |  | TDD | TDD |  |
| BWchannel | | | | Config 1 | MHz | 40: NRB,c = 106 | 40: NRB,c = 106 |  |
| DL initial BWP configuration | | | | Config 1 |  | DLBWP.0.1 | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | | Config |  | DLBWP.1.1 | DLBWP.1.1 |  |
| UL initial BWP configuration | | | | Config 1 |  | ULBWP.0.1 | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | | Config 1 |  | ULBWP.1.1 | ULBWP.1.1 |  |
| TDD Configuration | | | | Config 1 |  | TDDConf.1.1 CCA | TDDConf.1.1 CCA |  |
| CORESET Reference Channel | | | | Config 1 |  | CR.1.1 CCA | CR.1.1 CCA |  |
| SSB Configuration | | | | Config 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |  |
| DBT Window Configuration | | | | Config 1 |  | DBT.1 | DBT.1 |  |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1 |  | 30 KHz | 30 KHz |  |
| PRACH Configuration | | | | Config 1 |  | Table A.3.8.2.2-1 | Table A.3.8.2.2-1 |  |
| SSB Index assigned as BFD RS (q0) | | | | |  | 0 | 0 |  |
| SSB Index assigned as CBD RS (q1) | | | | |  | 1 | 1 |  |
| OCNG parameters | | | | |  | OP.1 | OP.1 |  |
| CP length | | | | |  | Normal | Normal |  |
| Correlation Matrix and Antenna Configuration | | | | |  | 2x2 Low | 2x2 Low |  |
| Beam failure detection transmission parameters | | DCI format | | |  | 1-0 | 1-0 |  |
|  | | Number of Control OFDM symbols | | |  | 2 | 2 |  |
|  | | Aggregation level | | | CCE | 8 | 8 |  |
|  | | Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | | | dB | 0 | 0 |  |
|  | | Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | | | dB | 0 | 0 |  |
|  | | DMRS precoder granularity | | |  | REG bundle size | REG bundle size |  |
|  | | REG bundle size | | |  | 6 | 6 |  |
| DRX | | | | |  | DRX.7 | DRX.7 | A.3.3.7 |
| Gap pattern ID | | | | |  | N.A. | N.A. |  |
| gapOffset | | | | |  | 0 | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | Config 1 | | | | dBm/SCS kHz | -95 | -95 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | | | |  | db0 | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | | |  | pbfd4 | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for CSI reporting | | | Config 1 | |  | CSI-RS.2.1 TDD | CSI-RS.2.1 TDD |  |
| CSI-RS for tracking | | | Config 1 | |  | TRS.1.2 TDD | TRS.1.2 TDD |  |
| SSB Index assigned as RLM RS | | |  | |  | 0, 1 | 0, 1 |  |
| T310 Timer | | |  | | ms | [1000] | [1000] |  |
| N310 | | |  | |  | [2] | [2] |  |
| T1 | | | | | s | [1] | [1] | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | [8.37] | [9.01] |  |
| T3 | | | | | s | [4.52] | [5.16] |  |
| T4 | | | | | s | [0] | [0] |  |
| T5 | | | | | s | [3.89] | [3.89] |  |
| D1 | | | | | s | [3.85] | [3.85] |  |
| 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.11.4.4.2.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA | | Note 10, 12 |  | TBD | TBD | TBD | TBD | TBD |
|  | | Note 11, 12 |  | TBD | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA | | |  | TBD | TBD | TBD | TBD | TBD |
| 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 |  | | | | |
| 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\_SSB of set q0 | Config 1 | | dB | 5 | -3 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1 | | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | Config 1 | | dBm/15 KHz | -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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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 the transmitted SSS REs during DBT window.  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.3.6A].  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

Table A.11.4.4.2.1-4: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 2 | | | | |
|  | | |  | T1 | T2 | T3 | T4 | T5 |
| DL CCA probability PCCA | | Note 10, 12 |  | TBD | TBD | TBD | TBD | TBD |
|  | | Note 11, 12 |  | TBD | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA | | |  | TBD | TBD | TBD | TBD | TBD |
| 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 |  | | | | |
| 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\_SSB of set q0 | Config 1 | | dB | 5 | [-1] | [-7] | [-7] | [-7] |
| SNR\_SSB of set q1 | Config 1 | | dB | -10 | -10 | 10 | 10 | 10 |
| SSB\_RP of set q1 | Config 1 | | dBm/SCS kHz | -105 | -105 | -85 | -85 | -85 |
|  | Config 1 | | dBm/15 KHz | -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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.  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 the transmitted SSS REs during DBT window.  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.3.6A].  Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.  Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.  Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only. | | | | | | | | |

****

**Figure A.11.4.4.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.11.4.4.2.2 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 initiate 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 = [3850] 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.

In Test 1, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot < -7 dB.

In Test 2, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot ≥ -7 dB.

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.11.4.5 Active BWP switching

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

##### A.11.4.5.1.1 Test Purpose and Environment

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

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

Before the test starts,

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

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

During T1,

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

During T2,

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

Table A.11.4.5.1.1-2: General test parameters for UL BWP switch test in SA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active Cell |  | Cell 1 | Cell1 on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| *lbt-FailureDetectionTimer* [2] | ms | 80 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [1] |
| *lbt-FailureInstanceMaxCount* [2] |  | 4 | Parameter configured by IE: *LBT-FailureRecoveryConfig* [1] |
| T1 | s | 0.1 | During T1 consistent LBT failure is detected on active UL BWP-1 |
| T2 | s | 0.1 | During T2 UE sends PRACH on active UL BWP-2 |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | |
| T1 | T2 |
| TDD configuration | Config 1 |  | TBD | |
| BWchannel | Config 1 |  | 40 MHz: NRB,c = 106 | |
| DL CCA model | Config 1 |  | As specified in clause A.3.20.2.1 | |
| UL CCA model | Config 1 |  | As specified in clause A.3.20.2.2 | |
| Active BWP ID | Config 1 |  | 1, 2 | |
| Initial DL BWP Configuration | Config 1 |  | DLBWP.0.2 Note 4 | |
| Active DL BWP-1 Configuration | Config 1 |  | DLBWP.1.1 Note 4 | |
| Active DL BWP-2 Configuration | Config 1 |  | DLBWP.1.3 Note 4 | |
| Initial UL BWP Configuration | Config 1 |  | ULBWP.0.2 Note 4 | |
| Active UL BWP-1 Configuration | Config 1 |  | ULBWP.1.1 Note 4 | |
| Active UL BWP-2 Configuration | Config 1 |  | ULBWP.1.3 Note 4 | |
| PDSCH Reference measurement channel | Config 1 |  | TBD | |
| RMSI CORESET parameters | Config 1 |  | TBD | |
| Dedicated CORESET parameters | Config 1 |  | TBD | |
| OCNG Patterns | Config 1 |  | OP.1 | |
| SSB Configuration | Config 1 |  | TBD | |
| SMTC Configuration | Config 1 |  | TBD | |
| Correlation Matrix and Antenna Configuration | Config 1 |  | 1x2 Low | |
| TRS Configuration | Config 1 |  | TBD | |
| DL CCA probability PCCA | Config 1 |  | TBD | TBD |
| UL CCA probability PCCA | Config 1 |  | TBD | TBD |
| PRACH configuration | Config 1 |  | N/A | Configuration #1 in Table A.3.8.2.1-1 |
| EPRE ratio of PSS to SSS | | dB | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  | |
| NocNote 2 | Config 1 | dBm/SCS | -101 | |
| SS-RSRP Note 3 | Config 1 | dBm/SCS | -84 | |
| Ês/Iot | Config 1 | dB | 17 | |
| Ês/Noc | Config 1 | dB | 17 | |
| IoNote3 | Config 1 | dBm/  38.16MHz | -52.86 | |
| Propagation Condition | |  | AWGN | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | |

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

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

##### A.11.4.5.1.2 Test Requirements

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

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

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

NOTE: The above delay is calculated as follows:’

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

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

Where:

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

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

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

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

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

A.11.4.5.2 DCI-based and Timer-based Active BWP Switch

A.11.4.5.2.1 NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA

A.11.4.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.11.4.5.2.1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.11.4.5.2.1.1-2. NR Cell-specific parameters are specified in Table A.11.4.5.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

- UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 2 before starting the test.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 in PCell.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-0 in SCell.

- UE is configured with a *bwp-InactivityTimer* timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1\_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell’s slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than the first UL slot that occurs after the beginning of slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PCell’s BWP-2 no later than the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on PCell (Cell 1).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell’s slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PCell’s BWP-1 no later than the first DL slot that occurs after the beginning of slot (*j+TBWPswitchDelay*).

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to SCell is carried out in the correct time span by monitoring ACK/NACK sent in SCell during BWP switch of PCell, respectively.

**Table A.11.4.5.2.1.1-1: DL BWP switch supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested. | |

**Table A.11.4.5.2.1.1-2: General test parameters for DL BWP switch in SA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1, 2 | Two NR radio channels are used in this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active SCell |  | Cell 2 | SCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | For both PCell and SCell |
| DL CCA model |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model |  | As specified in clause A.3.20.2.2 |  |
| *bwp-InactivityTimer* | ms | 200 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC. |
| Cell2 timing offset to cell1 | μs | 3 | Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

**Table A.11.4.5.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** | **Cell2** |
| Frequency Range | | |  | FR1 | |
| Duplex mode | | Config 1 |  | TDD | |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA | |
| BWchannel | | Config 1 |  | 40 MHz: NRB,c = 106 | |
| Active BWP ID | | |  | 1, 2 | 0 |
| Initial DL BWP Configuration | | |  | DLBWP.0.2Note4 | |
| Initial UL BWP Configuration | | |  | ULBWP.0.2Note4 | |
| Active DL BWP-0 Configuration | | |  | N.A. | DLBWP.0.2Note4 |
| Active DL BWP-1 Configuration | | |  | DLBWP.1.1Note4 | N.A. |
| Active DL BWP-2 Configuration | | |  | DLBWP.1.3Note4 | N.A. |
| Active UL BWP-0 Configuration | | |  | N.A. | ULBWP.0.2Note4 |
| Active UL BWP-1 Configuration | | |  | ULBWP.1.1Note4 | N.A. |
| Active UL BWP-2 Configuration | | |  | ULBWP.1.3Note4 | N.A. |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA | |
| RMSI CORESET parameters | | Config 1 |  | CR.1.1 CCA | |
| Dedicated CORESET parameters | | Config 1 |  | CCR.1.1 CCA | |
| OCNG Patterns | | |  | OP.1 | |
| SSB Configuration | Semi- static channel acces | Config 1 |  | SSB.1 CCA | |
| Dymamic channel acces | Config 1 |  | SSB.2 CCA | |
| SMTC Configuration | | Config 1 |  | SMTC.1 | |
| DL CCA probability (PCCA\_DL) | | Config 1 |  | 1 | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1 |  | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 Low | |
| EPRE ratio of PSS to SSS | | | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |  |
| NocNote 2 | | Config 1 | dBm/SCS | -101 | -101 |
| SS-RSRP Note 3 | | Config 1 | dBm/SCS | -84 | -84 |
| Ês/Iot | | Config 1 | dB | 17 | 17 |
| Ês/Noc | | Config 1 | dB | 17 | 17 |
| IoNote3 | | Config 1 | dBm/38.16MHz | -52.86 | -52.86 |
| Propagation Condition | | |  | AWGN | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3 SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | | |

A.11.4.5.2.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*i+TBWPswitchDelay*+*k1*).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*j+TBWPswitchDelay*+*k1*).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration *TBWPswitchDelay* defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first DL slot that occurs after the beginning of DL slot (*i+ TBWPswitchDelay*+*k1*), (*j+ TBWPswitchDelay*+*k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.11.4.5.2.2 NR FR1 DL active BWP switch with non-DRX in SA

A.11.4.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.

The supported test configurations are shown in Table A.11.4.5.2.2.1-1. The test scenario comprises of one cell (Cell 1) as given in Table A.11.4.5.2.2.1-2. Cell-specific parameters of the cell are specified in Table A.11.4.5.2.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.

- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1.

- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

The cell has constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1\_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell1’s slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1’s DL slot (*i+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 no later than the first UL slot that occurs after the beginning of slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on Cell1’s BWP-2 starting from the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

During T2, the test equipment won’t transmit DCI format for PDSCH reception on Cell1.

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1’s slot (*j+TBWPswitchDelay*) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 at latest on the first UL slot that occurs after the beginning of slot (*j+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on Cell1’s BWP-1 starting from the first DL slot that occurs after the beginning of slot (*j+TBWPswitchDelay*).

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

**Table A.11.4.5.2.2.1-1: DL BWP switch supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: A UE which fulfils the requirements in test case A.11.4.5.2.1 can skip the test cases in A.11.4.5.2.2.  Note 3: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested. | |

**Table A.11.4.5.2.2.1-2: General test parameters for DL BWP switch in SA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** | |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test | |
| Active Cell |  | Cell 1 | Cell1 on RF channel number 1. | |
| CP length |  | Normal |  | |
| DRX |  | OFF |  | |
| DL CCA model |  | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | As specified in clause A.3.20.2.2 | |  |
| *bwp-InactivityTimer* | ms | 200 |  | |
| T1 | s | 0.2 |  | |
| T2 | s | 0.2 |  | |
| T3 | s | 0.2 |  | |

**Table A.11.4.5.2.2.1-3: NR Cell specific test parameters for DL BWP switch in SA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** |
| Frequency Range | | |  | FR1 |
| Duplex mode | | Config 1 |  | TDD |
| TDD configuration | | Config 1 |  | TDDConf.1.1 CCA |
| BWchannel | | Config 1 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | |  | 1, 2 |
| Initial DL BWP Configuration | | Config 1 |  | DLBWP.0.2 Note 4 |
| Active DL BWP-1 Configuration | | Config 1 |  | DLBWP.1.1 Note 4 |
| Active DL BWP-2 Configuration | | Config 1 |  | DLBWP.1.3 Note 4 |
| Initial UL BWP Configuration | | Config 1 |  | ULBWP.0.2 Note 4 |
| Active UL BWP-1 Configuration | | Config 1 |  | ULBWP.1.1 Note 4 |
| Active UL BWP-2 Configuration | | Config 1 |  | ULBWP.1.3 Note 4 |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | Config 1 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | Config 1 |  | CCR.1.1 CCA |
| OCNG Patterns | | |  | OP.1 |
| SSB Configuration | Semi- static channel acces | Config 1 |  | SSB.1 CCA |
| Dymamic channel acces | Config 1 |  | SSB.2 CCA |
| SMTC Configuration | | Config 1 |  | SMTC.1 |
| Correlation Matrix and Antenna Configuration | | |  | 1x2 Low |
| TRS Configuration | | Config 1 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | Config 1 |  | 1 |
| UL CCA probability (PCCA\_UL) | | Config 1 |  | 1 |
| EPRE ratio of PSS to SSS | | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |
| NocNote 2 | | Config 1 | dBm/SCS | -101 |
| SS-RSRP Note 3 | | Config 1 | dBm/SCS | -84 |
| Ês/Iot | | Config 1 | dB | 17 |
| Ês/Noc | | Config 1 | dB | 17 |
| IoNote3 | | Config 1 | dBm/38.16 MHz | -52.86 |
| Propagation Condition | | |  | AWGN |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | |

A.11.4.5.2.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*i+TBWPswitchDelay*+*k1*).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot (*j+TBWPswitchDelay*+*k1*).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration *TBWPswitchDelay* defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed Cell1 active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after beginning of DL slot (*i+TBWPswitchDelay*+*k1*), (*j+TBWPswitchDelay*+*k1*), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.11.4.5.3 RRC-based Active BWP Switch

A.11.4.5.3.1 NR FR1 DL active BWP switch of Cell with non-DRX in SA

A.11.4.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.

The supported test configurations are shown in Table A.11.4.5.3.1.1-1. The test scenario comprises of one Cell (Cell 1) as given in Table A.11.4.5.3.1.1-2. Cell-specific parameters of Cell are specified in Table A.11.4.5.3.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition in Cell 1.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PCell’s slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot on BWP-1 of final condition. The UE shall be continuously scheduled on PCell’s BWP-1 of final condition starting from the first DL slot right after slot .

TRRCprocessingDelay and TBWPswitchDelayRRC are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in Cell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received is received.

**Table A.11.4.5.3.1.1-1: DL BWP switch supported test configurations in SA scenario**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested. | |

**Table A.11.4.5.3.1.1-2: General test parameters for DL BWP switch in SA scenario**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active Cell |  | Cell 1 | Cell on RF channel number 1. |
| CP length |  | Normal |  |
| DL CCA model |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model |  | As specified in clause A.3.20.2.2 |  |
| DRX |  | OFF |  |
| T1 | s | 0.2 |  |

**Table A.11.4.5.3.1.1-3: NR Cell specific test parameters for DL BWP switch in SA scenario**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Cell 1** |
| Frequency Range | | | |  | FR1 |
| Duplex mode | | | Config 1 |  | TDD |
| TDD configuration | | | Config 1 |  | TDDConf.1.1 CCA |
| BWchannel | | | Config 1 |  | 40 MHz: NRB,c = 106 |
| Active BWP ID | | | |  | 1 |
| Initial DL BWP Configuration | | | Config 1 |  | DLBWP.0.2 |
| Initial UL BWP Configuration | | | Config 1 |  | ULBWP.0.2 |
| Initial Condition | Active DL BWP-1 Configuration | | Config 1 |  | DLBWP.1.3 |
| Active UL BWP-1 Configuration | | Config 1 |  | ULBWP.1.3 |
| Final  Condition | Active DL BWP-1 Configuration | | Config 1 |  | DLBWP.1.1 |
| Active UL BWP-1 Configuration | | Config 1 |  | ULBWP.1.1 |
| PDSCH Reference measurement channel | | | Config 1 |  | SR.1.1 CCA |
| RMSI CORESET parameters | | | Config 1 |  | CR.1.1 CCA |
| Dedicated CORESET parameters | | | Config 1 |  | CCR.1.1 CCA |
| OCNG Patterns | | | |  | OP.1 |
| SSB Configuration | | Semi-static channel acces | Config 1 |  | SSB.1 CCA |
| Dymamic channel acces | Config 1 |  | SSB.2 CCA |
| SMTC Configuration | | | |  | SMTC.1 |
| TRS Configuration | | | Config 1 |  | TRS.1.2 TDD |
| DL CCA probability (PCCA\_DL) | | | Config 1 |  | 1 |
| UL CCA probability (PCCA\_UL) | | | Config 1 |  | 1 |
| Propagation Condition | | | |  | AWGN |
| EPRE ratio of PSS to SSS | | | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |  |  |
| EPRE ratio of PDSCH DMRS to SSS | | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | | |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) | | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |  |  |
| NocNote 2 | | | Config 1 | dBm/SCS | -101 |
| SS-RSRP Note 3 | | | Config 1 | dBm/SCS | -84 |
| Ês/Iot | | | Config 1 | dB | 17 |
| Ês/Noc | | | Config 1 | dB | 17 |
| IoNote3 | | | Config 1 | dBm/38.16MHz | -52.86 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | | |

A.11.4.5.3.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for the Cell from the first DL slot that occurs right after the begining of slot and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed Cell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

### A.11.4.6 Active TCI state switching delay

## A.11.5 Measurement procedure

### A.11.5.1 Intra-frequency measurements

#### A.11.5.1.1 Event-triggered reporting tests on PCC without gaps under non-DRX

##### A.11.5.1.1.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.11.5.1.1.2 Test parameters

Two cells are deployed in the test, which are PCell (Cell 1) and a neighbour cell (Cell 2) on the same carrier frequency with CCA transmitting SSBs in DBT windows according to DL CCA model. The test parameters for the two cells are given in Table A.11.5.1.1.2-1 and A.11.5.1.1.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 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 Cell 2.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

* In the first test (Test 1), the UE is configured with SS-RSRP as Event A3 measurement quantity.
* In the second test (Test 2), the UE is configured with SS-RSRQ as Event A3 measurement quantity.
* In the third test (Test 3), the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.11.5.1.1.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.5.1.1.2-2: General test parameters for intra-frequency event triggered reporting without gaps

Editor’s note: Table TBD

Table A.11.5.1.1.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gaps

Editor’s note: Table TBD

##### A.11.5.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.1.2 Event-triggered reporting tests on PCC without gaps under DRX

##### A.11.5.1.2.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.11.5.1.2.2 Test parameters

##### A.11.5.1.2.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.1.3 Event-triggered reporting tests on PCC with per-UE gaps under non-DRX

##### A.11.5.1.3.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.11.5.1.3.2 Test parameters

##### A.11.5.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.1.4 Event-triggered reporting tests on PCC with per-UE gaps under DRX

##### A.11.5.1.4.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.11.5.1.4.2 Test parameters

##### A.11.5.1.4.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.1.5 Event-triggered reporting tests on SCC without gaps under non-DRX

##### A.11.5.1.5.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.11.5.1.5.2 Test parameters

##### A.12.5.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.1.6 Event-triggered reporting tests on SCC without gaps under DRX

##### A.11.5.1.6.1 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 intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

##### A.11.5.1.6.2 Test parameters

##### A.11.5.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.1.7 Event-triggered reporting tests on SCC with per-UE gaps under non-DRX

##### A.11.5.1.7.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.11.5.1.7.2 Test parameters

##### A.11.5.1.7.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD.*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.1.8 Event-triggered reporting tests on SCC with per-UE gaps under DRX

##### A.11.5.1.8.1 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 intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

##### A.11.5.1.8.2 Test parameters

##### A.11.5.1.8.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

*Editor’s note: D1=TBD (D1 is different for different DRX configurations).*

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.1.9 RSSI measurement reporting on PCC

##### A.11.5.1.9.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

##### A.11.5.1.9.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.1.9.2-1. There is one cell in the test: Cell 1 which is PCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1.

Table A.11.5.1.9.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.5.1.9.2-2: General test parameters.

Editor’s note: Table TBD

#### A.11.5.1.10 Channel occupancy measurement reporting on PCC

##### A.11.5.1.10.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

##### A.11.5.1.10.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.1.10.2-1. There is one cell in the test: Cell 1 which is PCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1.

Table A.11.5.1.10.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.5.1.10.2-2: General test parameters.

Editor’s note: Table is TBD

#### A.11.5.1.11 RSSI measurement reporting on SCC

##### A.11.5.1.11.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

##### A.11.5.1.11.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.1.11.2-1. There are two cells in the test: Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2.

Table A.11.5.1.11.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.5.1.11.2-2: General test parameters.

Editor’s note: Tabls TBD

#### A.11.5.1.12 Channel occupancy measurement reporting on SCC

##### A.11.5.1.12.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

##### A.11.5.1.12.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.1.12.2-1. There are two cells in the test: Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2.

Table A.11.5.1.12.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.5.1.12.2-2: General test parameters.

Editor’s note: Table is TBD

### A.11.5.2 Inter-frequency measurements

#### A.11.5.2.1 RSSI measurement reporting

##### A.11.5.2.1.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the inter-frequency RSSI measurement reporting requirements in Section 9.3A.8.

##### A.11.5.2.1.2 Test parameters

In the test, the UE is configured to perform inter-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.2.1.2-1. There is one cell in the test: Cell 1 which is PCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1. The RSSI measurement is performed on an inter-frequency under CCA.

Table A.11.5.2.1.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.5.2.1.2-2: General test parameters.

Editor’s note: Table TBD

#### A.11.5.2.2 Channel occupancy measurement reporting

##### A.11.5.2.2.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the inter-frequency channel occupancy measurement reporting requirements in Section 9.3A.9.

##### A.11.5.2.2.2 Test parameters

In the test, the UE is configured to perform inter-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.2.2.2-1. There is one cell in the test: Cell 1 which is PCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1. The channel occupancy measurement is performed on an inter-frequency under CCA.

Table A.11.5.2.2.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.5.2.2.2-2: General test parameters.

Editor’s note: Table is TBD

#### A.11.5.2.3 Event triggered reporting tests for FR1 with CCA without SSB time index detection when DRX is not used

##### A.11.5.2.3.1 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 SA inter-frequency NR cell search requirements for NR cell with CCA in clause 9.3A.4 and 9.3A.5.

In this test, there are two cells: NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters are given in Tables A.11.5.2.3.1-1, A.11.5.2.3.1-2 and A.11.5.2.3.1-3.

In test 1, measurement gap pattern configuration # 0 as defined in Table A.11.5.2.3.1-2 is provided for UE that does not support per-FR gap. In test 2, measurement gap pattern configuration #4 as defined in Table A.11.5.2.3.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

Table A.11.5.2.3.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 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.11.5.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1 | 1, 2 | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cells |  | Config 1 | NR cell 1 with CCA (PCell) | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1 | NR cell 2 with CCA | | NR cell 2 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 9 | 9 |  |
| A3-Offset | dB | Config 1 | -6 | |  |
| Hysteresis | dB | Config 1 | 0 | |  |
| CP length |  | Config 1 | Normal | |  |
| TimeToTrigger | s | Config 1 | 0 | |  |
| Filter coefficient |  | Config 1 | 0 | | L3 filtering is not used |
| DRX |  | Config 1 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | | Synchronous cells. |
| T1 | s | Config 1 | [5] | |  |
| T2 | s | Config 1 | [1] | [1] |  |

Table A.11.5.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | Cell 2 | |
| T1 | T2 | | T1 | T2 |
| NR RF Channel Number | | |  | Config 1 | 1 | | | 2 | |
| Duplex mode | | |  | Config 1 | TDD | | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | |
| BWchannel | | | MHz | Config 1 | 40: NRB,c = 106 | | | | |
| BWP BW | | | MHz | Config 1 | 40: NRB,c = 106 | | | | |
| BWP configuration | Initial DL BWP | | Config 1 | Config 1 | DLBWP.0.1 | | | NA | |
| Initial UL BWP | | Config 1 | ULBWP.0.1 | | | NA | |
| Dedicated DL BWP | | Config 1 | DLBWP.1.1 | | | NA | |
| Dedicated UL BWP | | Config 1 | ULBWP.1.1 | | | NA | |
| TRS configuration | | |  | Config 1 | TRS.1.2 TDD | | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1 | OP.1 | | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 CCA | | |  | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 CCA | | |  | |
| SSB parameters | | Semi-static channel  access |  | Config 1 | SSB.1 CCA | | | SSB.1 CCA | |
|  | | Dynamic channel  access |  | Config 1 | SSB.2 CCA | | | SSB.2 CCA | |
| DBT window configuration | | |  | Config 1 | As defined in A.3.21.1 | | | As defined in A.3.21.1 | |
| SMTC configuration defined in A.3.11 | | |  | Config 1 | SMTC.1 | | | SMTC.4 | |
| DL CCA probability PCCA\_DL | | |  | Config 1 | TBD | | | TBD | |
| UL CCA probability PCCA\_UL | | |  | Config 1 | TBD | | | TBD | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 30 | | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1 | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1 | [-101] | | [-101] | | |
| Note2 | | | dBm/SCS | Config 1 | [-101] | | [-101] | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1 | -91 | -91 | | -Infinity | -88 |
|  | | | dB | Config 1 | 4 | 4 | | -Infinity | 7 |
|  | | | dB | Config 1 | 4 | 4 | | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1 | -58.49 | -58.49 | | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1 | AWGN | | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.11.5.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.2.4 Event triggered reporting tests for FR1 with CCA without SSB time index detection when DRX is used

##### A.11.5.2.4.1 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 SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.4.1-1, A.11.5.2.4.1-2 and A.11.5.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.11.5.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.11.5.2.4.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 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.11.5.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cells |  | Config 1 | NR cell 1 with CCA (PCell) | | | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1 | NR cell 2 with CCA | | | | NR cell 2 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1 | -6 | | | |  |
| Hysteresis | dB | Config 1 | 0 | | | |  |
| CP length |  | Config 1 | Normal | | | |  |
| TimeToTrigger | s | Config 1 | 0 | | | |  |
| Filter coefficient |  | Config 1 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1 | [5] | | | |  |
| T2 | s | Config 1 | [1.1] | [11] | [1.1] | [11] |  |

Table A.11.5.2.4.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | | T1 | T2 | T3 | T4 |
| NR RF Channel Number | | |  | Config 1 | 1 | | | | | 2 | | | |
| Duplex mode | | |  | Config 1 | TDD | | | | | | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | | | | | |
| BWchannel | | | MHz | Config 1 | 40: NRB,c = 106 | | | | | | | | |
| BWP BW | | | MHz | Config 1 | 40: NRB,c = 106 | | | | | | | | |
| BWP configuration | Initial DL BWP | | Config 1 | Config 1 | DLBWP.0.1 | | | | | NA | | | |
| Initial UL BWP | | Config 1 | ULBWP.0.1 | | | | | NA | | | |
| Dedicated DL BWP | | Config 1 | DLBWP.1.1 | | | | | NA | | | |
| Dedicated UL BWP | | Config 1 | ULBWP.1.1 | | | | | NA | | | |
| TRS configuration | | |  | Config 1 | TRS.1.2 TDD | | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1 | OP.1 | | | | | OP.1 | | | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 CCA | | | | |  | | | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 CCA | | | | |  | | | |
| SSB parameters | | Semi-static channel  access |  | Config 1 | SSB.1 CCA | | | | | SSB.1 CCA | | | |
|  | | Dynamic channel  access |  | Config 1 | SSB.2 CCA | | | | | SSB.2 CCA | | | |
| DBT window configuration | | |  | Config 1 | As defined in A.3.21.1 | | | | | As defined in A.3.21.1 | | | |
| SMTC configuration defined in A.3.11 | | |  | Config 1 | SMTC.1 | | | | | SMTC.4 | | | |
| DL CCA probability PCCA\_DL | | |  | Config 1 | TBD | | | | | TBD | | | |
| UL CCA probability PCCA\_UL | | |  | Config 1 | TBD | | | | | TBD | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 30 | | | | | | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1 | 0 | | | | | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1 | [-101] | | | | [-101] | | | | |
| Note2 | | | dBm/SCS | Config 1 | [-101] | | | | [-101] | | | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1 | -91 | | -91 | | | -Infinity | | -88 | |
|  | | | dB | Config 1 | 4 | | 4 | | | -Infinity | | 7 | |
|  | | | dB | Config 1 | 4 | | 4 | | | -Infinity | | 7 | |
| IoNote3 | | | dBm/9.36MHz | Config 1 | -58.49 | | -58.49 | | | -63.94 | | -56.15 | |
| Propagation Condition | | |  | Config 1 | AWGN | | | | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.11.5.2.4.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table A.11.5.2.4.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.11.5.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.2.5 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is not used

##### A.11.5.2.5.1 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 SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.5.1-1, A.11.5.2.5.1-2 and A.11.5.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.5.1-2 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.11.5.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

Table A.11.5.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 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.11.5.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1 | 1, 2 | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cells |  | Config 1 | NR cell 1 with CCA (PCell) | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1 | NR cell 2 with CCA | | NR cell 2 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 9 | 9 |  |
| A3-Offset | dB | Config 1 | -6 | |  |
| Hysteresis | dB | Config 1 | 0 | |  |
| CP length |  | Config 1 | Normal | |  |
| TimeToTrigger | s | Config 1 | 0 | |  |
| Filter coefficient |  | Config 1 | 0 | | L3 filtering is not used |
| DRX |  | Config 1 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | | Synchronous cells. |
| T1 | s | Config 1 | [5] | |  |
| T2 | s | Config 1 | [1] | [1] |  |

Table A.11.5.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | Cell 2 | |
| T1 | T2 | | T1 | T2 |
| NR RF Channel Number | | |  | Config 1 | 1 | | | 2 | |
| Duplex mode | | |  | Config 1 | TDD | | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | |
| BWchannel | | | MHz | Config 1 | 40: NRB,c = 106 | | | | |
| BWP BW | | | MHz | Config 1 | 40: NRB,c = 106 | | | | |
| BWP configuration | Initial DL BWP | | Config 1 | Config 1 | DLBWP.0.1 | | | NA | |
| Initial UL BWP | | Config 1 | ULBWP.0.1 | | | NA | |
| Dedicated DL BWP | | Config 1 | DLBWP.1.1 | | | NA | |
| Dedicated UL BWP | | Config 1 | ULBWP.1.1 | | | NA | |
| TRS configuration | | |  | Config 1 | TRS.1.2 TDD | | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1 | OP.1 | | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 CCA | | |  | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 CCA | | |  | |
| SSB parameters | | Semi-static channel |  | Config 1 | SSB.1 CCA | | | SSB.1 CCA | |
|  | | access |  |
|  | | Dynamic channel |  | Config 1 | SSB.2 CCA | | | SSB.2 CCA | |
|  | | access |  |
| DBT window configuration | | |  | Config 1 | As defined in A.3.21.1 | | | As defined in A.3.21.1 | |
| SMTC configuration defined in A.3.11 | | |  | Config 1 | SMTC.1 | | | SMTC.4 | |
| DL CCA probability PCCA\_DL | | |  | Config 1 | TBD | | | TBD | |
| UL CCA probability PCCA\_UL | | |  | Config 1 | TBD | | | TBD | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 30 | | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1 | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1 | [-101] | | [-101] | | |
| Note2 | | | dBm/SCS | Config 1 | [-101] | | [-101] | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1 | -91 | -91 | | -Infinity | -88 |
|  | | | dB | Config 1 | 4 | 4 | | -Infinity | 7 |
|  | | | dB | Config 1 | 4 | 4 | | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1 | -58.49 | -58.49 | | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1 | AWGN | | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.11.5.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.2.6 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is used

##### A.11.5.2.6.1 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 SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.6.1-1, A.11.5.2.6.1-2 and A.11.5.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.6.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.11.5.2.6.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.11.5.2.6.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 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.11.5.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA. |
| Active cells |  | Config 1 | NR cell 1 with CCA (PCell) | | | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1 | NR cell 2 with CCA | | | | NR cell 2 is on NR RF channel number 2 with CCA. |
| DL CCA model |  | Config 1 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1 | -6 | | | |  |
| Hysteresis | dB | Config 1 | 0 | | | |  |
| CP length |  | Config 1 | Normal | | | |  |
| TimeToTrigger | s | Config 1 | 0 | | | |  |
| Filter coefficient |  | Config 1 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1 | [5] | | | |  |
| T2 | s | Config 1 | [1.1] | [11] | [1.1] | [11] |  |

Table A.11.5.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | | T1 | T2 | T3 | T4 |
| NR RF Channel Number | | |  | Config 1 | 1 | | | | | 2 | | | |
| Duplex mode | | |  | Config 1 | TDD | | | | | | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | | | | | |
| BWchannel | | | MHz | Config 1 | 40: NRB,c = 106 | | | | | | | | |
| BWP BW | | | MHz | Config 1 | 40: NRB,c = 106 | | | | | | | | |
| BWP configuration | Initial DL BWP | | Config 1 | Config 1 | DLBWP.0.1 | | | | | NA | | | |
| Initial UL BWP | | Config 1 | ULBWP.0.1 | | | | | NA | | | |
| Dedicated DL BWP | | Config 1 | DLBWP.1.1 | | | | | NA | | | |
| Dedicated UL BWP | | Config 1 | ULBWP.1.1 | | | | | NA | | | |
| TRS configuration | | |  | Config 1 | TRS.1.2 TDD | | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1 | OP.1 | | | | | OP.1 | | | |
| PDSCH Reference measurement channel | | |  | Config 1 | SR.1.1 CCA | | | | |  | | | |
| CORESET Reference Channel | | |  | Config 1 | CR.1.1 CCA | | | | |  | | | |
| SSB parameters | | Semi-static channel |  | Config 1 | SSB.1 CCA | | | | | SSB.1 CCA | | | |
|  | | access |  |
|  | | Dynamic channel |  | Config 1 | SSB.2 CCA | | | | | SSB.2 CCA | | | |
|  | | access |  |
| DBT window configuration | | |  | Config 1 | As defined in A.3.21.1 | | | | | As defined in A.3.21.1 | | | |
| SMTC configuration defined in A.3.11 | | |  | Config 1 | SMTC.1 | | | | | SMTC.4 | | | |
| DL CCA probability PCCA\_DL | | |  | Config 1 | TBD | | | | | TBD | | | |
| UL CCA probability PCCA\_UL | | |  | Config 1 | TBD | | | | | TBD | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1 | 30 | | | | | | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1 | 0 | | | | | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1 | [-101] | | | | [-101] | | | | |
| Note2 | | | dBm/SCS | Config 1 | [-101] | | | | [-101] | | | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1 | -91 | | -91 | | | -Infinity | | -88 | |
|  | | | dB | Config 1 | 4 | | 4 | | | -Infinity | | 7 | |
|  | | | dB | Config 1 | 4 | | 4 | | | -Infinity | | 7 | |
| IoNote3 | | | dBm/9.36MHz | Config 1 | -58.49 | | -58.49 | | | -63.94 | | -56.15 | |
| Propagation Condition | | |  | Config 1 | AWGN | | | | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.11.5.2.6.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table A.11.5.2.6.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.11.5.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of

#### A.11.5.2.7 Event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

##### A.11.5.2.7.1 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 SA inter-frequency NR cell search requirements for NR cell with CCA in clause 9.3A.4 and 9.3A.5.

In this test, there are two cells: NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.11.5.2.7.1-1, A.11.5.2.7.1-2 and A.11.5.2.7.1-3.

In test 1, measurement gap pattern configuration # 0 as defined in Table A.11.5.2.7.1-2 is provided for UE that does not support per-FR gap. In test 2, measurement gap pattern configuration #4 as defined in Table A.11.5.2.7.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

Table A.11.5.2.7.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 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.11.5.2.7.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA. |
| Active cell |  | Config 1,2,3 | NR cell 1 (PCell) | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3 | -6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| CP length |  | Config 1,2,3 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 1,2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 1 | 1 |  |

Table A.11.5.2.7.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | | |  | Config 1 | TDD | | FDD | |
|  | Config 2,3 | TDD | | TDD | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | Not Applicable | |
|  | Config 2 | TDDConf.1.1 CCA | | TDDConf.1.1 | |
|  | Config 3 | TDDConf.1.1 CCA | | TDDConf.2.1 | |
| BWchannel | | | MHz | Config 1,2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | | MHz | Config 1,2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | NA | |
| TRS configuration | | |  | Config 1,2,3 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1,2,3 | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1,2,3 | CR.1.1 CCA | |  | |
| SSB parameters | | Semi-static channel |  | Config 1,2 | SSB.1 CCA | | SSB.1 FR1 | |
|  | | access |  | Config 3 | SSB.1 CCA | | SSB.2 FR1 | |
|  | | Dynamic channel |  | Config 1,2 | SSB.2 CCA | | SSB.1 FR1 | |
|  | | access |  | Config 3 | SSB.2 CCA | | SSB.2 FR1 | |
| DBT window configuration | | |  | Config 1,2,3 | As defined in A.3.21.1 | | Not applicable | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1,2 | 30 | | 15 | |
| Config 3 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | | |  | Config 1 | TBD | | NA | |
| UL CCA probability PCCA\_UL | | |  | Config 1 | TBD | | NA | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | [-101] | | -98 | |
| Note2 | | | dBm/SCS | Config 1,2 | [-101] | | -98 | |
| Config 3 | [-101] | | -95 | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -91 | -91 | -Infinity | -91 |
| Config 3 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -58.49 | -58.49 | -70.05 | -62.26 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.11.5.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.2.8 Event triggered reporting tests for FR1 without SSB time index detection when DRX is used

##### A.11.5.2.8.1 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 SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.8.1-1, A.11.5.2.8.1-2 and A.11.5.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.8.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.11.5.2.8.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.11.5.2.8.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 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.11.5.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA. |
| Active cell |  | Config 1,2,3 | NR cell 1 (PCell) | | | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| CP length |  | Config 1,2,3 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 1,2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | | | |  |
| T2 | s | Config 1,2,3 | [1.1] | [11] | [1.1] | [11] |  |

Table A.11.5.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | | | 2 | | | |
| Duplex mode | | |  | Config 1 | TDD | | | | FDD | | | |
|  | Config 2,3 | TDD | | | | TDD | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | Not Applicable | | | |
|  | Config 2 | TDDConf.1.1 CCA | | | | TDDConf.1.1 | | | |
|  | Config 3 | TDDConf.1.1 CCA | | | | TDDConf.2.1 | | | |
| BWchannel | | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP BW | | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | | |  | Config 1,2,3 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference measurement channel | | |  | Config 1,2,3 | SR.1.1 CCA | | | |  | | | |
| CORESET Reference Channel | | |  | Config 1,2,3 | CR.1.1 CCA | | | |  | | | |
| SSB parameters | | Semi-static channel |  | Config 1,2 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
|  | | access |  | Config 3 | SSB.1 CCA | | | | SSB.2 FR1 | | | |
|  | | Dynamic channel |  | Config 1,2 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  | | access |  | Config 3 | SSB.2 CCA | | | | SSB.2 FR1 | | | |
| DBT window configuration | | |  | Config 1,2,3 | As defined in A.3.21.1 | | | | Not applicable | | | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1,2 | 30 | | | | 15 | | | |
| Config 3 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | | |  | Config 1 | TBD | | | | NA | | | |
| UL CCA probability PCCA\_UL | | |  | Config 1 | TBD | | | | NA | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | | | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | [-101] | | | | -98 | | | |
| Note2 | | | dBm/SCS | Config 1,2 | [-101] | | | | -98 | | | |
| Config 3 | [-101] | | | | -95 | | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -91 | | -91 | | -Infinity | | -91 | |
| Config 3 | -91 | | -91 | | -Infinity | | -88 | |
|  | | | dB | Config 1,2,3 | 4 | | 4 | | -Infinity | | 7 | |
|  | | | dB | Config 1,2,3 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -58.49 | | -58.49 | | -70.05 | | -62.26 | |
| dBm/38.16MHz | Config 3 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.11.5.2.8.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table A.11.5.2.8.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.11.5.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

Tidentify\_inter\_cca\_without\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.2.9 Event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

##### A.11.5.2.9.1 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 SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.9.1-1, A.11.5.2.9.1-2 and A.11.5.2.9.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.9.1-2 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.11.5.2.9.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

Table A.11.5.2.9.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 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.11.5.2.9.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA. |
| Active cell |  | Config 1,2,3 | NR cell 1 (PCell) | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.2 | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | 4 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | 9 |  |
| A3-Offset | dB | Config 1,2,3 | -6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| CP length |  | Config 1,2,3 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 1,2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 1 | 1 |  |

Table A.11.5.2.9.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | | |  | Config 1 | TDD | | FDD | |
|  | Config 2,3 | TDD | | TDD | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | Not Applicable | |
|  | Config 2 | TDDConf.1.1 CCA | | TDDConf.1.1 | |
|  | Config 3 | TDDConf.1.1 CCA | | TDDConf.2.1 | |
| BWchannel | | | MHz | Config 1,2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP BW | | | MHz | Config 1,2 | 40: NRB,c = 106 | | 10: NRB,c = 52 | |
| Config 3 | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | NA | |
| Initial UL BWP | |  | ULBWP.0.1 | | NA | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | NA | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | NA | |
| TRS configuration | | |  | Config 1,2,3 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | | |  | Config 1,2,3 | SR.1.1 CCA | |  | |
| CORESET Reference Channel | | |  | Config 1,2,3 | CR.1.1 CCA | |  | |
| SSB parameters | | Semi-static channel |  | Config 1,2 | SSB.1 CCA | | SSB.1 FR1 | |
|  | | access |  | Config 3 | SSB.1 CCA | | SSB.2 FR1 | |
|  | | Dynamic channel |  | Config 1,2 | SSB.2 CCA | | SSB.1 FR1 | |
|  | | access |  | Config 3 | SSB.2 CCA | | SSB.2 FR1 | |
| DBT window configuration | | |  | Config 1,2,3 | As defined in A.3.21.1 | | Not applicable | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1,2 | 30 | | 15 | |
| Config 3 | 30 | | 30 | |
| DL CCA probability PCCA\_DL | | |  | Config 1 | TBD | | NA | |
| UL CCA probability PCCA\_UL | | |  | Config 1 | TBD | | NA | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | [-101] | | -98 | |
| Note2 | | | dBm/SCS | Config 1,2 | [-101] | | -98 | |
| Config 3 | [-101] | | -95 | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -91 | -91 | -Infinity | -91 |
| Config 3 | -91 | -91 | -Infinity | -88 |
|  | | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
|  | | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -58.49 | -58.49 | -70.05 | -62.26 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.11.5.2.9.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.2.10 Event triggered reporting tests for FR1 with SSB time index detection when DRX is used

##### A.11.5.2.10.1 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 SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.10.1-1, A.11.5.2.10.1-2 and A.11.5.2.10.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.10.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.11.5.2.10.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 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 3.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.11.5.2.10.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  NR cell without CCA: 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.11.5.2.10.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| Test 1 | Test 2 | Test 3 | Test 4 |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | | | | Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA. |
| Active cell |  | Config 1,2,3 | NR cell 1 (PCell) | | | | NR cell 1 is on NR RF channel number 1 with CCA. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| DL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  | Config 1,2,3 | As specified in clause A.3.20.2.2 | | | |  |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | 4 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | | 9 | |  |
| A3-Offset | dB | Config 1,2,3 | -6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| CP length |  | Config 1,2,3 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | DRX.1 | DRX.2 | DRX.1 | DRX.2 | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 1,2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | | | |  |
| T2 | s | Config 1,2,3 | [1.1] | [11] | [1.1] | [11] |  |

Table A.11.5.2.10.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test configuration | Cell 1 | | | | Cell 2 | | | |
| T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| NR RF Channel Number | | |  | Config 1,2,3 | 1 | | | | 2 | | | |
| Duplex mode | | |  | Config 1 | TDD | | | | FDD | | | |
|  | Config 2,3 | TDD | | | | TDD | | | |
| TDD configuration | | |  | Config 1 | TDDConf.1.1 CCA | | | | Not Applicable | | | |
|  | Config 2 | TDDConf.1.1 CCA | | | | TDDConf.1.1 | | | |
|  | Config 3 | TDDConf.1.1 CCA | | | | TDDConf.2.1 | | | |
| BWchannel | | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP BW | | | MHz | Config 1,2 | 40: NRB,c = 106 | | | | 10: NRB,c = 52 | | | |
| Config 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | | |
| BWP configuration | Initial DL BWP | |  | Config 1,2,3 | DLBWP.0.1 | | | | NA | | | |
| Initial UL BWP | |  | ULBWP.0.1 | | | | NA | | | |
| Dedicated DL BWP | |  | DLBWP.1.1 | | | | NA | | | |
| Dedicated UL BWP | |  | ULBWP.1.1 | | | | NA | | | |
| TRS configuration | | |  | Config 1,2,3 | TRS.1.2 TDD | | | | NA | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | | |  | Config 1,2,3 | OP.1 | | | | OP.1 | | | |
| PDSCH Reference measurement channel | | |  | Config 1,2,3 | SR.1.1 CCA | | | |  | | | |
| CORESET Reference Channel | | |  | Config 1,2,3 | CR.1.1 CCA | | | |  | | | |
| SSB parameters | | Semi-static channel |  | Config 1,2 | SSB.1 CCA | | | | SSB.1 FR1 | | | |
|  | | access |  | Config 3 | SSB.1 CCA | | | | SSB.2 FR1 | | | |
|  | | Dynamic channel |  | Config 1,2 | SSB.2 CCA | | | | SSB.1 FR1 | | | |
|  | | access |  | Config 3 | SSB.2 CCA | | | | SSB.2 FR1 | | | |
| DBT window configuration | | |  | Config 1,2,3 | As defined in A.3.21.1 | | | | Not applicable | | | |
| SMTC configuration defined in A.3.11 | | |  | Config 1,2,3 | SMTC.1 | | | | SMTC.4 | | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | Config 1,2 | 30 | | | | 15 | | | |
| Config 3 | 30 | | | | 30 | | | |
| DL CCA probability PCCA\_DL | | |  | Config 1 | TBD | | | | NA | | | |
| UL CCA probability PCCA\_UL | | |  | Config 1 | TBD | | | | NA | | | |
| EPRE ratio of PSS to SSS | | |  | Config 1,2,3 | 0 | | | | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | |  |
| EPRE ratio of PDSCH to PDSCH | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |
| Note2 | | | dBm/15kHz | Config 1,2,3 | [-101] | | | | -98 | | | |
| Note2 | | | dBm/SCS | Config 1,2 | [-101] | | | | -98 | | | |
| Config 3 | [-101] | | | | -95 | | | |
| SS-RSRP Note 3 | | | dBm/SCS | Config 1,2 | -91 | | -91 | | -Infinity | | -91 | |
| Config 3 | -91 | | -91 | | -Infinity | | -88 | |
|  | | | dB | Config 1,2,3 | 4 | | 4 | | -Infinity | | 7 | |
|  | | | dB | Config 1,2,3 | 4 | | 4 | | -Infinity | | 7 | |
| IoNote3 | | | dBm/9.36MHz | Config 1,2 | -58.49 | | -58.49 | | -70.05 | | -62.26 | |
| dBm/38.16MHz | Config 3 | -58.49 | | -58.49 | | -63.94 | | -56.15 | |
| Propagation Condition | | |  | Config 1,2,3 | AWGN | | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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.11.5.2.10.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Test1&3 | Test2&4 | Comment |
| Value | Value |
| drx-onDurationTimer | ms1 | ms1 | As specified in clause 6.3.2 in TS 38.331 [2] |
| drx-InactivityTimer | ms1 | ms1 |
| drx-RetransmissionTimerDL | sl1 | sl1 |
| drx-RetransmissionTimerUL | sl1 | sl1 |
| drx-LongCycleStartOffset | ms40 | Ms640 |
| shortDRX | disable | disable |  |

Table A.11.5.2.10.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.11.5.2.10.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than Tidentify\_inter\_cca\_with\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

Tidentify\_inter\_cca\_with\_index = (TPSS/SSS\_sync\_inter\_cca + T SSB\_measurement\_period\_inter\_cca + TSSB\_time\_index\_inter\_cca) ms, where

TPSS/SSS\_sync\_inter\_cca: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

TSSB\_time\_index\_inter\_cca: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

T SSB\_measurement\_period\_inter\_cca: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

### A.11.5.3 Inter-RAT E-UTRAN measurements

### A.11.5.4 L1-RSRP measurements for beam reporting

#### A.11.5.4.1 SSB based L1-RSRP measurement when DRX is not used

##### A.11.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.1.1-1.

Table A.11.5.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | With CCA: 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 | |

##### A.11.5.4.1.2 Test parameters

There is one cell in the test, the FR1 PCell (Cell 1). Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.1.2-1 and Table A.11.5.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.1.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1 |  | freq1 |
| DL CCA model | 1 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.1.1 CCA |
| BWchannel | 1 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 CCA |
| SSB configuration | 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | 1 |  | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.2 TDD |
| DRX configuration | 1 |  | Off |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | ssb-Index-RSRP |
| Number of reported RS | 1 |  | 2 |
| L1-RSRP reporting period | 1 | slot | 80 |
| T1 | 1 | s | 5 |
| T2 | 1 | s | 1 |
| EPRE ratio of PSS to SSS | 1 | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.11.5.4.1.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1 |  | TBD | TBD | TBD | TBD |
| Note2 | 1 | dBm/15kHz | -94.65 | | | |
| Note2 | 1 | dBm/SSB SCS | -91.65 | | | |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.11.5.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.4.2 SSB based L1-RSRP measurement when DRX is used

##### A.11.5.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.2.1-1.

Table A.11.5.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | With CCA: 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 | |

##### A.11.5.4.2.2 Test parameters

There is one cell in the test, the FR1 PCell (Cell 1). Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.2.2-1 and Table A.11.5.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.2.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1 |  | freq1 |
| DL CCA model | 1 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.1.1 CCA |
| BWchannel | 1 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 CCA |
| SSB configuration | 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | 1 |  | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.2 TDD |
| DRX configuration | 1 |  | DRX.3 |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | ssb-Index-RSRP |
| Number of reported RS | 1 |  | 2 |
| L1-RSRP reporting period | 1 | slot | 80 |
| T1 | 1 | s | 5 |
| T2 | 1 | s | 1 |
| EPRE ratio of PSS to SSS | 1 | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.11.5.4.2.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1 |  | TBD | TBD | TBD | TBD |
| Note2 | 1 | dBm/15kHz | -94.65 | | | |
| Note2 | 1 | dBm/SSB SCS | -91.65 | | | |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.11.5.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.4.3 SSB based L1-RSRP measurement on SCC when DRX is not used

##### A.11.5.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.1.1-1.

Table A.11.5.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | With CCA: 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 | |

##### A.11.5.4.3.2 Test parameters

There are two cells in the test, the FR1 PCell (Cell 1) and FR1 SCell (Cell 2). Both Cell 1 and Cell 2 operate on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.3.2-1 and Table A.11.5.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.3.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PCell | 1 |  | Cell 1 |
| Active SCell | 1 |  | Cell 2 |
| RF Channel Number | 1 |  | 1: Cell 1  2: Cell 2 |
| DL CCA model | 1 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.1.1 CCA |
| BWchannel | 1 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 CCA |
| SSB configuration | 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | 1 |  | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.2 TDD |
| DRX configuration | 1 |  | Off |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | ssb-Index-RSRP |
| Number of reported RS | 1 |  | 2 |
| L1-RSRP reporting period | 1 | slot | 80 |
| T1 | 1 | s | 5 |
| T2 | 1 | s | 1 |
| EPRE ratio of PSS to SSS | 1 | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.11.5.4.3.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1 |  | TBD | TBD | TBD | TBD |
| Note2 | 1 | dBm/15kHz | -94.65 | | | |
| Note2 | 1 | dBm/SSB SCS | -91.65 | | | |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.11.5.4.3.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.11.5.4.4 SSB based L1-RSRP measurement on SCC when DRX is used

##### A.11.5.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.4.1-1.

Table A.11.5.4.4.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | With CCA: 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 | |

##### A.11.5.4.3.2 Test parameters

There are two cells in the test, the FR1 PCell (Cell 1) and FR1 SCell (Cell 2). Both Cell 1 and Cell 2 operate on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.4.2-1 and Table A.11.5.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured*.*

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.4.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| Active PCell | 1 |  | Cell 1 |
| Active SCell | 1 |  | Cell 2 |
| RF Channel Number | 1 |  | 1: Cell 1  2: Cell 2 |
| DL CCA model | 1 |  | As specifieed in A.3.20.2.1 |
| UL CCA model | 1 |  | As specified in A.3.20.2.2 |
| Duplex mode | 1 |  | TDD |
| TDD Configuration | 1 |  | TDDConf.1.1 CCA |
| BWchannel | 1 | MHz | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 CCA |
| SSB configuration | 1 |  | SSB.3 CCA for semi-static channel access  SSB.4 CCA for dynamic channel access |
| OCNG Patterns | 1 |  | OP.1 |
| Initial BWP Configuration | 1 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1 |  | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | 1 |  | DBT.1 |
| TRS Configuration | 1 |  | TRS.1.2 TDD |
| DRX configuration | 1 |  | DRX.3 |
| reportConfigType | 1 |  | periodic |
| reportQuantity | 1 |  | ssb-Index-RSRP |
| Number of reported RS | 1 |  | 2 |
| L1-RSRP reporting period | 1 | slot | 80 |
| T1 | 1 | s | 5 |
| T2 | 1 | s | 1 |
| EPRE ratio of PSS to SSS | 1 | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH DMRS |  |  |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |  |  |
| Propagation condition | 1 |  | 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. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window. | | | |

Table A.11.5.4.4.2-2: SSB specific test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | SSB#0 | | SSB#1 | |
|  |  |  | T1 | T2 | T1 | T2 |
| DL CCA Probability PCCA\_DL | 1 |  | TBD | TBD | TBD | TBD |
| UL CCA probability PCCA\_UL | 1 |  | TBD | TBD | TBD | TBD |
| Note2 | 1 | dBm/15kHz | -94.65 | | | |
| Note2 | 1 | dBm/SSB SCS | -91.65 | | | |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| SSB RSRP Note3 | 1 | dBm/SSB SCS | -91.65 | -91.65 | -Infinity | -88.65 |
| Io Note3 | 1 | dBm/38.16 MHz | -57.59 | -57.59 | -60.61 | -55.84 |
|  | 1 | dB | 0 | 0 | -Infinity | 3 |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.  Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | |

##### A.11.5.4.4.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.11.6 Measurement performance

### A.11.6.1 SS-RSRP

#### A.11.6.1.1 Intra-frequency measurement accuracy on a carrier frequency with CCA

##### A.11.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy on the carrier frequency with CCA is within the specified limits. This test will verify the requirements in clauses 10.1.27.1.1 and 10.1.27.1.2 for intra-frequency measurements under CCA.

##### A.11.6.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model. Supported test configurations are shown in table A.11.6.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.11.6.1.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.11.6.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.6.1.1.2-2: SS-RSRP Intra frequency test parameters

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | | Unit | Test 1 | | | Test 2 | | | | | | Test 3 | | | | | |
|  | | | | | |  | Cell 1 | Cell 2 | | Cell 1 | | Cell 2 | | | | Cell 1 | | | Cell 2 | | |
| Cell ID | | | | | |  | 489 | 0 | | 489 | | 0 | | | | 489 | | 0 | | | |
| SSB ARFCN | | | | | |  | freq1 | | | freq1 | | | | | | freq1 | | | | | |
| TDD configuration | | | | Config 1 | |  | TDDConf.1.1 CCA | | | | | | | | | | | | | | |
| BWchannel | | | | Config 1 | | MHz | 40: NRB,c = 106 | | | | | | | | | | | | | | |
| BWP BW | | | | Config 1 | |  | 40: NRB,c = 106 | | | | | | | | | | | | | | |
| DL CCA model | | | | | |  | As specified in clause A.3.20.2.1 | | | | | | | | | | | | | | |
| UL CCA model | | | | | |  | As specified in clause A.3.20.2.2 | | | | | | | | | | | | | | |
| PCCA\_DL | | | | | |  | [TBD] | | | | | | | | | | | | | | |
| PCCA\_UL | | | | | |  | [TBD] | | | | | | | | | | | | | | |
| Downlink initial BWP configuration | | | | | |  | DLBWP.0.1 | | | | | | | | | | | | | | |
| Downlink dedicated BWP configuration | | | | | |  | DLBWP.1.1 | | | | | | | | | | | | | | |
| Uplink initial BWP configuration | | | | | |  | ULBWP.0.1 | | | | | | | | | | | | | | |
| Uplink dedicated BWP configuration | | | | | |  | ULBWP.1.1 | | | | | | | | | | | | | | |
| TRS configuration | | | | | Config 1 |  | TRS.1.2 TDD | | NA | | TRS.1.2 TDD | | | NA | TRS.1.2 TDD | | | | | | NA |
| DRX Cycle | | | | | | ms | Not Applicable | | | | | | | | | | | | | | |
| PDSCH Reference measurement channel | | | | Config 1 | |  | SR.1.1 CCA | | - | SR.1.1 CCA | | - | | | | SR.1.1 CCA | | | | | - |
| RMSI CORESET Reference Channel | | | | Config 1 | |  | CR.1.1 CCA | | - | CR.1.1 CCA | | - | | | | CR.1.1 CCA | | | | | - |
| Control channel RMC | | | | Config 1 | |  | CR.1.1 CCA | | - | CR.1.1 CCA | | - | | | | CR.1.1 CCA | | | | | - |
| SSB configuration for semi-static channel access | | | | Config 1 | |  | SSB.1 CCA | | SSB.1 CCA | SSB.1 CCA | | SSB.1 CCA | | | | SSB.1 CCA | | | | | SSB.1 CCA |
| SSB configuration for dynamic channel access | | | | Config 1 | |  | SSB.2 CCA | | SSB.2 CCA | SSB.2 CCA | | SSB.2 CCA | | | | SSB.2 CCA | | | | | SSB.2 CCA |
| DBT window configuration | | | | Config 1,2,3 | |  | DBT.1 | | DBT.1 | DBT.1 | | DBT.1 | | | | DBT.1 | | | | | DBT.1 |
| Time offset with Cell 1 | | Config 1 | | | | μs | - | | 3 | - | | 3 | | | | - | | | | 3 | |
| SMTC configuration | | Config 1 | | | |  | SMTC.1 | | | | | | | | | | | | | | |
| OCNG Patterns | | | | | |  | OCNG pattern 1 | | | | | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1 | | kHz | 30 kHz | | | | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | | dB | 0 | | 0 | 0 | | | 0 | | | | 0 | | | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH to PDSCH | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| Note2 | Config 1 | | | | NR\_TDD\_FR1\_I |  | Not applicableNote 5 | | | -94 | | | | | | | TBD | | | | |
| Note2 | Config 1 | NR\_TDD\_FR1\_I | | | | dBm/SCS | Not applicableNote 5 | | | -91 | | | | | | | TBD | | | | |
| Note6 | | | | | | dB | 2.46 | | -5.97 | 2.46 | | | -5.97 | | | | TBD | | | | TBD |
| Note6 | | | | | | dB | 6 | | 1 | 6 | | | 1 | | | | TBD | | | | TBD |
| SS-RSRPNote3,6 | Config 1 | | NR\_TDD\_FR1\_I | | | dBm/SCS | Not applicableNote 5 | | Not applicableNote 5 | -85 | | | -90 | | | | TBD | | | | TBD |
| IoNote3 | Config 1 | | | NR\_TDD\_FR1\_I | | dBm/  38.16MHz | Not applicableNote 5- | | | -51.99 | | | | | | | TBD | | | | |
| Propagation condition | | | | | | - | AWGN | | | | | | | | | | | | | | |
| Antenna configuration | | | | | |  | 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: Subtest 1 is not used when testing with 30kHz SSB SCS.  NOTE 6: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | | | | | | | | | | | | | | | | |

##### A.11.6.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.27.1.1 and relative requirement in clause 10.1.27.1.2.

#### A.11.6.1.2 Intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

##### A.11.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy on the carrier frequency with CCA is within the specified limits. This test will verify the requirements in clauses 10.1.27.1.1 and 10.1.27.1.2 for intra-frequency measurements under CCA.

##### A.11.6.1.2.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1) on the carrier frequency with CCA, and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). Supported test configurations are shown in table A.11.6.1.2.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.11.6.1.2.2-2.

Table A.11.6.1.2.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.11.6.1.2.2-2: SS-RSRP Intra frequency test parameters

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | | | Unit | Test 1 | | | Test 2 | | | | | | Test 3 | | | | | |
|  | | | | | |  | Cell 2 | Cell 3 | | Cell 2 | | Cell 3 | | | | Cell 2 | | | Cell 3 | | |
| Cell ID | | | | | |  | 489 | 0 | | 489 | | 0 | | | | 489 | | 0 | | | |
| SSB ARFCN | | | | | |  | freq1 | | | freq1 | | | | | | freq1 | | | | | |
| TDD configuration | | | | Config 1 | |  | TDDConf.1.1 CCA | | | | | | | | | | | | | | |
| BWchannel | | | | Config 1 | | MHz | 40: NRB,c = 106 | | | | | | | | | | | | | | |
| BWP BW | | | | Config 1 | |  | 40: NRB,c = 106 | | | | | | | | | | | | | | |
| DL CCA model | | | | | |  | As specified in clause A.3.20.2.1 | | | | | | | | | | | | | | |
| UL CCA model | | | | | |  | As specified in clause A.3.20.2.2 | | | | | | | | | | | | | | |
| PCCA\_DL | | | | | |  | [TBD] | | | | | | | | | | | | | | |
| PCCA\_UL | | | | | |  | [TBD] | | | | | | | | | | | | | | |
| Downlink initial BWP configuration | | | | | |  | DLBWP.0.1 | | | | | | | | | | | | | | |
| Downlink dedicated BWP configuration | | | | | |  | DLBWP.1.1 | | | | | | | | | | | | | | |
| Uplink initial BWP configuration | | | | | |  | ULBWP.0.1 | | | | | | | | | | | | | | |
| Uplink dedicated BWP configuration | | | | | |  | ULBWP.1.1 | | | | | | | | | | | | | | |
| TRS configuration | | | | | Config 1 |  | TRS.1.2 TDD | | NA | | TRS.1.2 TDD | | | NA | TRS.1.2 TDD | | | | | | NA |
| DRX Cycle | | | | | | ms | Not Applicable | | | | | | | | | | | | | | |
| PDSCH Reference measurement channel | | | | Config 1 | |  | SR.1.1 CCA | | - | SR.1.1 CCA | | - | | | | SR.1.1 CCA | | | | | - |
| RMSI CORESET Reference Channel | | | | Config 1 | |  | CR.1.1 CCA | | - | CR.1.1 CCA | | - | | | | CR.1.1 CCA | | | | | - |
| Control channel RMC | | | | Config 1 | |  | CR.1.1 CCA | | - | CR.1.1 CCA | | - | | | | CR.1.1 CCA | | | | | - |
| SSB configuration for semi-static channel access | | | | Config 1 | |  | SSB.1 CCA | | SSB.1 CCA | SSB.1 CCA | | SSB.1 CCA | | | | SSB.1 CCA | | | | | SSB.1 CCA |
| SSB configuration for dynamic channel access | | | | Config 1 | |  | SSB.2 CCA | | SSB.2 CCA | SSB.2 CCA | | SSB.2 CCA | | | | SSB.2 CCA | | | | | SSB.2 CCA |
| DBT window configuration | | | | Config 1,2,3 | |  | DBT.1 | | DBT.1 | DBT.1 | | DBT.1 | | | | DBT.1 | | | | | DBT.1 |
| Time offset with Cell 1 | | Config 1 | | | | μs | - | | 3 | - | | 3 | | | | - | | | | 3 | |
| SMTC configuration | | Config 1 | | | |  | SMTC.1 | | | | | | | | | | | | | | |
| OCNG Patterns | | | | | |  | OCNG pattern 1 | | | | | | | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | | | Config 1 | | kHz | 30 kHz | | | | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | | | | | dB | 0 | | 0 | 0 | | | 0 | | | | 0 | | | | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PBCH to PBCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH DMRS to SSS | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of PDSCH to PDSCH | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | | | |  |  | |  |  | | |  | | | |  | | | |  |
| Note2 | Config 1 | | | | NR\_TDD\_FR1\_I |  | Not applicableNote 5 | | | -94 | | | | | | | TBD | | | | |
| Note2 | Config 1 | NR\_TDD\_FR1\_I | | | | dBm/SCS | Not applicableNote 5 | | | -91 | | | | | | | TBD | | | | |
| Note6 | | | | | | dB | 2.46 | | -5.97 | 2.46 | | | -5.97 | | | | TBD | | | | TBD |
| Note6 | | | | | | dB | 6 | | 1 | 6 | | | 1 | | | | TBD | | | | TBD |
| SS-RSRPNote3 | Config 1 | | NR\_TDD\_FR1\_I | | | dBm/SCS | Not applicableNote 5 | | Not applicableNote 5 | -85 | | | -90 | | | | TBD | | | | TBD |
| IoNote3 | Config 1 | | | NR\_TDD\_FR1\_I | | dBm/  38.16MHz | Not applicableNote 5- | | | -51.99 | | | | | | | TBD | | | | |
| Propagation condition | | | | | | - | AWGN | | | | | | | | | | | | | | |
| Antenna configuration | | | | | |  | 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: Subtest 1 is not used when testing with 30kHz SSB SCS.  NOTE 6: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | | | | | | | | | | | | | | | | | | |

##### A.11.6.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.27.1.1 and relative requirement in clause 10.1.27.1.2.

### A.11.6.2 SS-RSRQ

### A.11.6.3 SS-SINR

### A.11.6.4 L1-RSRP measurement for beam reporting with CCA serving cell

#### A.11.6.4.1 SSB based L1-RSRP measurement

##### A.11.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.33.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.11.6.4.1.1-1.

Table A.11.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations in each supported band | |

##### A.11.6.4.1.2 Test parameters

In this set of test cases there one cell in the test, PCell under CCA (Cell 1). Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model.

Two sub-tests (Test 1 and Test 2) are provided with different *Noc* on Cell 1. The test parameters for the Cell 1 are given in Table A.11.6.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.11.6.4.1.2-1.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.11.6.4.1.2-1: FR1 SSB based L1-RSRP test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Config | Unit | Test 1 | Test 2 |
| SSB GSCN | | 1 |  | freq1 | freq1 |
| DL CCA model | | 1 |  | As specifieed in A.3.20.2.1 | As specifieed in A.3.20.2.1 |
| UL CCA model | | 1 |  | As specified in A.3.20.2.2 | As specified in A.3.20.2.2 |
| Duplex mode | | 1 |  | TDD | TDD |
| TDD configuration | | 1 |  | TDDConf.1.1 CCA | TDDConf.1.1 CCA |
| BWchannel | | 1 | MHz | 40: NRB,c = 106 | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | | 1 |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel | | 1 |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel | | 1 |  | CCR.1.1 CCA | CCR.1.1 CCA |
| SSB configuration Semi-static channel access | | 1 |  | SSB.3 CCA | SSB.3 CCA |
| SSB configuration for Dynamic channel access | | 1 |  | SSB.4 CCA | SSB.4 CCA |
| OCNG Patterns | | 1 |  | OP.1 | OP.1 |
| Initial BWP Configuration | | 1 |  | DLBWP.0.1  ULBWP.0.1 | DLBWP.0.1  ULBWP.0.1 |
| TRS configuration | | 1 |  | TRS.1.2 TDD | TRS.1.2 TDD |
| Dedicated BWP configuration | | 1 |  | DLBWP.1.1  ULBWP.1.1 | DLBWP.1.1  ULBWP.1.1 |
| DBT Window Configuration | | 1 |  | DBT.1 | DBT.1 |
| reportConfigType | | 1 |  | periodic | periodic |
| reportQuantity | | 1 |  | ssb-Index-RSRP | ssb-Index-RSRP |
| Number of reported RS | | 1 |  | 2 | 2 |
| L1-RSRP reporting period | | 1 |  | slot80 | slot80 |
| EPRE ratio of PSS to SSS | | 1 | 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 DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Note2 | NR\_TDD\_FR1\_I | 1 | dBm/15kHz | -94.65 | [-113] |
| Note2 | NR\_TDD\_FR1\_I | 1 | dBm/SCS | -91.65 | [-110] |
|  | | 1 | dB | 10 | -3 |
| SS-RSRPNote3 | NR\_TDD\_FR1\_I | 1 | dBm/SCS | -81.65 | [-113] |
| IoNote3 | NR\_TDD\_FR1\_I | 1 | dBm/  38.16MHz | -50.19 | [-77.19] |
|  | | 1 | dB | 10 | -3 |
| Propagation condition | | 1 |  | AWGN | AWGN |
| Antenna configuration | | 1 |  | 1x2 | 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: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: 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. | | | | | |

##### A.11.6.4.1.3 Test Requirements

In both Test 1 and Test 2, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 1 shall fulfil the requirements in clauses 10.1.33.1.

### A.11.6.5 RSSI

#### A.11.6.5.1 Intra-frequency RSSI measurement accuracy on PCC with CCA

#### A.11.6.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

#### A.11.6.5.1.2 Test parameters

In all test cases, Cell 1 is the PCell with CCA. RSSI is measured on channel number 1. Supported test configurations are shown in table A.11.6.5.1.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.11.6.5.1.2-2 and A.11.6.5.1.2-3.

Table A.11.6.5.1.2-1: Intra frequency RSSI supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.6.5.1.2-2: RSSI Intra frequency test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 |
| Cell 1 |
| RF Channel Number |  |  | 1 |
| BWchannel |  | MHz | 40 |
| PCCA\_DL |  |  | TBD |
| PCCA\_UL |  |  | TBD |
| DL CCA model |  |  | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth |
| Channel access bandwidth |  | MHz | 20 |
| DRX Cycle configuration |  | ms | Not Applicable |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.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) |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD |
| Propagation condition |  | - | AWGN |

Table A.11.6.5.1.2-3: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.11.6.5.1.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

#### A.11.6.5.2 Intra-frequency RSSI measurement accuracy on SCC with CCA

#### A.11.6.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

#### A.11.6.5.2.2 Test parameters

In all test cases, Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is SCell operating on a carrier frequency under CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.11.6.5.2.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.11.6.5.2.2-2 and A.11.6.5.2.2-3.

Table A.11.6.5.2.2-1: Intra frequency RSSI supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.6.5.2.2-2: RSSI Intra frequency test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |

Table A.11.6.5.2.2-3: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.11.6.5.2.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

#### A.11.6.5.3 Inter-frequency RSSI measurement accuracy on a carrier with CCA

#### A.11.6.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.2.

#### A.11.6.5.3.2 Test parameters

In all test cases, Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is neighbor cell operating on a carrier frequency under CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.11.6.5.3.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.11.6.5.3.2-2 and A.11.6.5.3.2-3.

Table A.11.6.5.3.2-1: Inter frequency RSSI supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.6.5.3.2-2: RSSI Inter frequency test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |

Table A.11.6.5.3.2-3: RSSI RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.11.6.5.3.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.2. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

### A.11.6.6 Channel occupancy

#### A.11.6.6.1 Intra-frequency channel occupancy measurement accuracy on PCC with CCA

#### A.11.6.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

#### A.11.6.6.1.2 Test parameters

In all test cases, Cell 1 is the PCell with CCA. channel occupancy is measured on channel number 1. Supported test configurations are shown in table A.11.6.6.1.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.11.6.6.1.2-2 and A.11.6.6.1.2-3.

Table A.11.6.6.1.2-1: Intra frequency CO supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.6.6.1.2-2: CO Intra frequency test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 |
| Cell 1 |
| RF Channel Number |  |  | 1 |
| BWchannel |  | MHz | 40 |
| PCCA\_DL |  |  | TBD |
| PCCA\_UL |  |  | TBD |
| DL CCA model |  |  | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth |
| Channel access bandwidth |  | MHz | 20 |
| DRX Cycle configuration |  | ms | Not Applicable |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.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) |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD |
| Propagation condition |  | - | AWGN |
| channelOccupancyThreshold |  | dBm | TBD |

Table A.11.6.6.1.2-3: CO RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.11.6.6.1.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

#### A.11.6.6.2 Intra-frequency channel occupancy measurement accuracy on SCC with CCA

#### A.11.6.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

#### A.11.6.6.2.2 Test parameters

In all test cases, Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is SCell operating on a carrier frequency under CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.11.6.6.2.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.11.6.6.2.2-2 and A.11.6.6.2.2-3.

Table A.11.6.6.2.2-1: Intra frequency CO supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.6.6.2.2-2: CO Intra frequency test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |
| channelOccupancyThreshold |  | dBm | TBD | |

Table A.11.6.6.2.2-3: CO RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.11.6.6.2.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

#### A.11.6.6.3 Inter-frequency channel occupancy measurement accuracy on a carrier with CCA

#### A.11.6.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.34.2.

#### A.11.6.6.3.2 Test parameters

In all test cases, Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is neighbor cell operating on a carrier frequency under CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.11.6.6.3.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.11.6.6.3.2-2 and A.11.6.6.3.2-3.

Table A.11.6.6.3.2-1: Inter frequency CO supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

Table A.11.6.6.3.2-2: CO Inter frequency test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Configurations | Unit | Test 1 | |
| Cell 1 | Cell 2 |
| RF Channel Number |  |  | 1 | 2 |
| BWchannel |  | MHz | 40 | 40 |
| PCCA\_DL |  |  | NA | TBD |
| PCCA\_UL |  |  | NA | TBD |
| DL CCA model |  |  | N/A | As specifieed in A.3.20.2.1 |
| UL CCA model |  |  | N/A | As specified in A.3.20.2.2 |
| Measurement bandwidth |  |  | Same as channel access bandwidth | |
| Channel access bandwidth |  | MHz | 20 | |
| DRX Cycle configuration |  | ms | Not Applicable | |
| PDSCH Reference measurement channel |  |  | SR.1.1 CCA | SR.1.1 CCA |
| RMSI CORESET Reference Channel |  |  | CR.1.1 CCA | CR.1.1 CCA |
| Dedicated CORESET Reference Channel |  |  | CCR.1.1 CCA | CCR.1.1 CCA |
| OCNG Patterns |  |  | OP.1 | OP.1 |
| EPRE ratio of PSS to SSS |  | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |  |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | NA | TBD |
| in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dB | TBD | TBD |
| in slots corresponding to RSSI measurement time configuration (RMTC) |  | dB | NA | TBD |
| SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/SCS | TBD | TBD |
| SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC) |  |  | NA | TBD |
| Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | TBD | TBD |
| Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC) |  | dBm/BW | NA | TBD |
| Propagation condition |  | - | AWGN | |
| channelOccupancyThreshold |  | dBm | TBD | |

Table A.11.6.6.3.2-3: CO RMTC parameters

|  |  |
| --- | --- |
| measDurationSymbols-r16 | sym14or12 |
| rmtc-Periodicity-r16 | ms40 |
| rmtc-SubframeOffset-r16 | 20 |
| ref-SCS-CP-r16 | kHz15 |
| ReportInterval | ms120 |

#### A.11.6.6.3.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

### A.11.6.7 E-UTRAN RSRP

### A.11.6.8 E-UTRAN RSRQ

A.11.6.9 E-UTRAN SINR

# A.12 E-UTRA Standalone Tests with at Least One NR Cell under CCA

## A.12.1 RRC\_IDLE state mobility

### A.12.1.1 Inter-RAT cell re-selection to NR on a carrier frequency with CCA

#### A.12.1.1.1 E-UTRA Cell reselection to higher priority NR target Cell in FR1 when target cell is subject to CCA

##### A.12.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT cell subject to CCA reselection requirements specified in clause 4.2.2.5.7 in TS 36.133 [15].

The test scenario comprises of 1 E-UTRA cell and 1 NR cell subject to CCA as given in tables A.12.1.1.1.1-1, A.8.2.1.1.1-2, A.8.2.1.1.1-3 and A.8.2.1.1.1-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

Table A.12.1.1.1.1-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell without CCA | Description of a cell with CCA |
| 1 | LTE FDD | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Table A.12.1.1.1.1-2: General test parameters for E-UTRA cell re-selection FR1 NR cell subject to CCA test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell2 | The UE camps on cell 2 in the initial phase |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| T1 end condition | Active cell |  |  | Cell1 | During T1 period the UE reselects to cell 1 |
|  | Neighbour cell |  |  | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2 | Cell2 | The UE shall perform reselection to cell 2 during T3 |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| RF Channel Number | |  | 1, 2 | 1, 2 | E-UTRAN radio channel (1) and NR radio channel (2) are used for this test |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| DBT Window Configuration | |  | 1, 2 | TBD | As specified in clause A.3.21.1. |
| DL CCA model | |  | 1, 2 | As specified in clause A.3.20.2.1 | DL CCA model |
| UL CCA model | |  | 1, 2 | As specified in clause A.3.20.2.2 | UL CCA model |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| T1 | | s | 1, 2 | TBD | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2 | TBD | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2 | TBD | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A12.1.1.1.1-3: Cell specific test parameters for NR cell 2 subject to CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | |
|  |  |  | T1 | T2 | T3 |
| TDD configuration |  | 1, 2 | TBD | | |
| DL CCA probability PCCA\_DL |  | 1, 2 | TBD | | |
| UL CCA probability PCCA\_UL |  | 1, 2 | TBD | | |
| Md,max |  | 1, 2 | 16 | | |
| Mm,max |  | 1, 2 | 4 | | |
| Me,max |  | 1, 2 | 8 | | |
| PDSCH Reference measurement channel |  | 1, 2 | TBD | | |
| RMSI CORESET Reference Channel |  | 1, 2 | TBD | | |
| RMC CORESET Reference Channel |  | 1, 2 | TBD | | |
| OCNG Patterns |  | 1, 2 | OP.1 | | |
| SSB configuration |  | 1, 2 | TBD | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2 | SSB | | |
| Qrxlevmin | dBm/SCS | 1, 2 | -137 | | |
| Pcompensation | dB | 1, 2 | 0 | | |
| Qhysts | dB | 1, 2 | 0 | | |
| Qoffsets, n | dB | 1, 2 | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | |
|  | dB | 1, 2 | -4 | -infinity | 12 |
|  |  |  |  |  |
|  |  |  |  |  |
| Note2 | dBm/SCS | 1, 2 | -95 | | |
| Note2 | dBm/15 kHz | 1, 2 | -98 | | |
|  |  |  | | |
|  |  |  | | |
|  | dB | 1, 2 | -4 | -infinity | 12 |
|  |  |  |  |  |
|  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1, 2 | -99 | -infinity | -83 |
| Io | dBm/38.16 MHz | 1, 2 | -62.50 | -63.95 | -51.69 |
| Treselection | s | 1, 2 | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2 | 50 | | |
| Threshx, highP | dB | 1, 2 | 48 | | |
| Threshserving, lowP | dB | 1, 2 | 44 | | |
| Threshx, lowP | dB | 1, 2 | 50 | | |
| Propagation Condition |  | 1, 2 | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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. | | | | | |

Table A.12.1.1.1.1-4: Cell specific test parameters for E-UTRA cell 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | |
|  |  | T1 | T2 | T3 |
| E-UTRA RF Channel number |  | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | | |
| PBCH\_RA | dB | 0 | | |
| PBCH\_RB | dB |  | | |
| PSS\_RA | dB |  | | |
| SSS\_RA | dB |  | | |
| PCFICH\_RB | dB |  | | |
| PHICH\_RA | dB |  | | |
| PHICH\_RB | dB |  | | |
| PDCCH\_RA | dB |  | | |
| PDCCH\_RB | dB |  | | |
| PDSCH\_RA | dB |  | | |
| PDSCH\_RB | dB |  | | |
| OCNG\_RANote 1 | dB |  | | |
| OCNG\_RBNote 1 | dB |  | | |
| Qrxlevmin | dBm | -140 | | |
| Note 2 | dBm/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 |
|  | dB | 14 | 14 | 14 |
|  | dB | 14 | 14 | 14 |
| TreselectionEUTRAN | S | 0 | | |
| SnonintrasearchP | dB | 50 | | |
| Threshx, highP | dB | 48 | | |
| Threshserving, lowP | dB | 44 | | |
| Threshx, lowP | dB | 50 | | |
| Propagation Condition |  | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

##### A.12.1.1.1.2 Test Requirements

The cell reselection delay to a higher priority NR cell subject to CCA is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon cell 2.

The cell re-selection delay to a higher priority cell shall be less than 60 + 1.28 x (5 + Me) + TSI\_CCA s. Me is the number of DRX cycles with at least one SMTC where there are no SSBs available during the Tevaluate,NR\_Intra\_CCA. If Me > Me,max the UE is required to restart the evaluation of cell 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate, NR\_ inter\_CCA + TSI\_CCA, and to a lower priority cell can be expressed as: Tevaluate, NR + TSI-NR,

Where:

Thigher\_priority\_search See clause 4.2.2 in TS 36.133 [15]

Tevaluate, NR\_ inter\_CCA See Table 4.2.2.5.7-1 in clause 4.2.2.5.7

TSI\_CCA Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.

Tevaluate, NR See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

TSI-NR Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority NR cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

## A.12.2 RRC\_CONNECTED state mobility

### A.12.2.1 Handover

#### A.12.2.1.1 E-UTRAN - NR with CCA handover

##### A.12.2.1.1.1 Test Purpose and Environment

This test shall verify the E-UTRAN to NR FR1 handover requirements specified in clause 5.3.4A in TS 36.133 [15].

The test comprises of one E-UTRA carrier and one NR carrier with CCA. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN cell and Cell 2 is an inter-RAT NR neighbour cell with CCA.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 of TS 36.133 [15] is configured before T2 begins to enable inter-RAT frequency monitoring. A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.12.2.1.1-1. General test parameters are provided in Table A.12.2.1.1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.12.2.1.1-3 and A.12.2.1.1-4 respectively.

Table A.12.2.1.1-1: Supported test configurations for E-UTRAN inter-RAT NR handover

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table A.12.2.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency with CCA is used in the test |
| LTE RF Channel Number | |  | 2 | 1 E-UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | E-UTRAN cell |
| Neighbouring cell |  | Cell 2 | NR cell with CCA |
| Final condition | Active cell |  | Cell 2 |  |
| DL CCA model | |  | As specified in clause A.3.20.2.1 |  |
| UL CCA model | |  | As specified in clause A.3.20.2.2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | -84 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2NR | | dBm | As specified in Table A.12.2.1.1-4 | Absolute NR SS-RSRP threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts [15] |
| T1 | | s | [5] |  |
| T2 | | s | [£5] |  |
| T3 | | s | [1] |  |

Table A.12.2.1.1-3: Cell specific test parameters for E-UTRAN inter-RAT NR handover with CCA (Cell 1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | | |
| T1 | T2 | T3 |
| RF channel number |  | 1, 2 | 2 | | |
| Duplex mode |  | 1 | FDD | | |
|  |  | 2 | TDD | | |
| TDD special subframe configurationNote1 |  | 1, 2 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 1, 2 | 1 | | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | | |
| PRACH ConfigurationNote2 |  | 1 | 4 | | |
| 2 | 53 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | | |
| 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | | |
| 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | | |
| OCNG PatternsNote3 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | | |
| 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | | |
| PBCH\_RA | dB | 1, 2 | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote4 |
| OCNG\_RBNote4 |
| NocNote5 | dBm/15kHz | 1, 2 | -98 | | |
| Ês/Noc | dB | 1, 2 | 7 | 7 | 7 |
| Ês/IotNote6 | dB | 1, 2 | 7 | 7 | 7 |
| RSRPNote6 | dBm/15kHz | 1, 2 | -91 | -91 | -91 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2 | -91 | -91 | -91 |
| IoNote6 | dBm/9MHz | 1, 2 | -62.43 | -62.43 | -62.43 |
| Propagation Condition |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2 | 1x2 Low | | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | | |

Table A.12.2.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR with CCA handover (Cell 2)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Configuration | Cell 2 | | |
|  | T1 | T2 | T3 |
| RF channel number | | |  | 1, 2 | 1 | | |
| DL CCA probability PCCA\_DL | | |  |  | TBD | | |
| UL CCA probability PCCA\_UL | | |  |  | TBD | | |
| Duplex mode | | |  | 1, 2 | TDD | | |
| TDD Configuration | | |  | 1, 2 | TDDConf.1.1 CCA | | |
| BWchannel | | | MHz | 1, 2 | 40: NRB,c = 106 (TDD) | | |
| PDSCH reference measurement channel | | |  | 1, 2 | SR.1.1 CCA | | |
| CORESET reference channel | | |  | 1, 2 | CR.1.1 CCA | | |
| PRACH configuration | | |  | 1, 2 | TBD | | |
| OCNG patternNote1 | | |  | 1, 2 | OP.1 | | |
| BWP | Initial DL BWP | |  | 1, 2 | DLBWP.0.1 | | |
| Dedicated DL BWP | | DLBWP.1.1 | | |
| Initial UL BWP | | ULBWP.0.1 | | |
| Dedicated UL BWP | | ULBWP.1.1 | | |
| SMTC configuration | | |  | 1, 2 | SMTC.1 | | |
| SSB configuration | | Semi-static channel access |  | 1, 2 | SSB.1 CCA | | |
|  | | Dynamic channel access |  | 1, 2 | SSB.2 CCA | | |
| DBT window configuration | | |  |  | As defined in A.3.21.1 | | |
| b2-Threshold2NR | | | dBm | 1 | -105 | | |
| 2 | -103 | | |
| EPRE ratio of PSS to SSS | | | dB | 1, 2 | 0 | | |
| EPRE ratio of PBCH\_DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH\_DMRS | | |
| EPRE ratio of PDCCH\_DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | |
| EPRE ratio of PDSCH\_DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | |
| EPRE ratio of OCNG DMRS to SSS | | |
| EPRE ratio of OCNG to OCNG DMRS | | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2 | [-104] | | |
| *Noc*Note2 | | | dBm/SCS | 1, 2 | [-101] | | |
| Ês/Noc | | | dB | 1, 2 | -inifinit | 0 | 0 |
| Ês/IotNote3 | | | dB | 1, 2 | -inifinit | 0 | 0 |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2 | -inifinit | -95 | -95 |
| IoNote3 | | | dBm/38.16 MHz | 1, 2 | -63.96 | -60.94 | -60.94 |
| Propagation condition | | |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2 | 1x2 Low | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

##### A.12.2.1.1.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than TBD ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 50 ms and is specified in TS36.331.

Tinterrupt = 62 + ( L1´ + L3) \* SMTC periodicity ms in the test; Tinterrupt is defined in TS36.133 clause 5.3.4A.3.

L1´ is the number of SMTC occasions not available at the UE during the inter-RAT detection period.

[L3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. L3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [57].]

This gives a total of 112 ms + L1´ + L3.

## A.12.3 Signalling characteristics

### A.12.3.1 Interruptions

## A.12.4 Measurement procedure

### A.12.4.1 E-UTRAN−NR inter-RAT SFTD measurements

#### A.12.4.1.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay with NR under CCA in non-DRX

##### A.12.4.1.1.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell under CCA is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and no DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier under CCA with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 2 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.12.4.1.1.1-1 below. General test parameters and cell-specific parameters for the NR cell are provided in Tables A.12.4.1.1.1-2 and A.12.4.1.1.1-3 below, respectively. Cell-specific parameters for the E-UTRA cell are provided in clause A.3.7.2.1.

Table A.12.4.1.1.1-1: Applicable test configurations for inter-RAT SFTD measurement delay test with NR under CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.12.4.1.1.1-2: General test parameters for inter-RAT SFTD measurement delay test with NR under CCA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| **Test 1** | **Test 2** |
| E-UTRA RF Channel Number |  | Config 1,2 | 1 | | One E-UTRAN carrier frequencies is used. |
| NR RF Channel Number |  | Config 1,2 | 1 | | One NR carrier frequencies is used. |
| Active cell |  | Config 1,2 | Cell 1 | | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | Config 1,2 | Cell 2 | | Cell 2 is on NR RF channel number 1. |
| CP length |  | Config 1,2 | Normal | | Applicable to both cells. |
| DRX |  | Config 1,2 | OFF | | DRX is not used |
| Frame time offset between serving and neighbour cells | ms | Config 1 | 3 | 7 | Asynchronous cells.  The timing of Cell 2 relative to the timing of Cell 1. |
| ms | Config 2 | 3 | | Synchronous cells. |
| SFN offset between serving and neighbour cells |  | Config 1,2 | 0 | 1 | SFN of Cell 2 relative to SFN of Cell 1. |
| SS-RSRP reporting |  | Config 1,2 | No | | Only SFTD is reported. |
| T1 | s | Config 1,2 | [2] | | T1 shall exceed Tmeasure\_SFTD\_LBT\_max = 56 × SMTC |

Table A.12.4.1.1.1-3: Cell specific test parameters for Cell 2 in inter-RAT SFTD measurement delay test with NR under CCA

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 2 |
| NR RF Channel Number |  | 1 |
| Duplex mode |  | TDD |
| BWchannel | MHz | 40: NRB,c = 106 |
| TDD configuration |  | TDDConf.2.1 |
| DL CCA model |  | [As specified in clause A.3.20.2.1] |
| DL CCA probability PCCA\_DL |  | TBD |
| OCNG Pattern defined in A.3.2.1.1Note 1 |  | OP.1 |
| SMTC configuration defined in A.3.2.11.1 and A.3.2.11.2 |  | [SMTC.2] |
| SSB configuration |  | [SSB.2 FR1] |
| DBT window configuration |  | TBD |
| PDSCH/PDCCH subcarrier spacing | kHz | 30 |
| 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 OCNG DMRS to SSS Note 1 | dB |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | dB |
| Noc Note2 | dBm/15kHz | -98 |
| Noc Note2 | dBm/SCS | -95 |
| SS-RSRP Note 3, 4 | dBm/SCS | -91 |
| Ês/Iot | dB | 4 |
| Ês/Noc | dB | 4 |
| Io Note 3 | dBm/38.16MHz | -62.27 |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts.  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: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | |

##### A.12.4.1.1.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at TRRC\_procedure\_delay + Tmeasure\_SFTD\_LBT\_max after the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2×TTIDCCH longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

### A.12.4.2 E-UTRAN−NR inter-RAT measurements on NR carrier frequency under CCA

#### A.12.4.2.1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

##### A.12.4.2.1.1 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 8.1.2.4.21A of TS 36.133 [15] for E-UTRAN FDD-NR measurements under CCA and clause 8.1.2.4.22A of TS 36.133 [15] for E-UTRAN TDD-NR measurements under CCA.

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 on a carrier frequency with CCA. The test parameters are given in Tables A.12.4.2.1.1-1, A.12.4.2.1.1-2, A.12.4.2.1.1-3 and A.12.4.2.1.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.12.4.2.1.1-2 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.12.4.2.1.1-2 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 UE is tested when MeasTriggerQuantity is configured as RSRP, RSRQ and SINR for each test. 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.12.4.2.1.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD |
| 2 | LTE TDD; NR with CCA: 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.12.4.2.1.1-2: 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 | 1 | | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number |  | 1, 2 | 1 | | One FR1 NR carrier frequency under CCA is used. |
| DL CCA model |  |  | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  |  | As specified in clause A.3.20.2.2 | |  |
| Active cell |  | 1, 2 | E-UTRA cell 1 (PCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2 | NR cell 2 | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset |  | 1, 2 | 39 | 19 | As specified in TS 36.331 [16]. |
| b2-Threshold1 | dBm | 1, 2 | Note 1 | | E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | dBm | 1, 2 | Note 2 | | SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 2 for event B2 [16] |
| Hysteresis | dB | 1, 2 | 0 | |  |
| CP length |  | 1, 2 | Normal | |  |
| TimeToTrigger | s | 1, 2 | 0 | |  |
| Filter coefficient |  | 1, 2 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | 1, 2 | 3μs | | Synchronous cells. |
| T1 | s | 1, 2 | 5 | |  |
| T2 | s | 1, 2 | ≥Tidentify\_irat\_cca\_without\_index | ≥Tidentify\_irat\_cca\_without\_index | Tidentify\_irat\_cca\_without\_index­ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133 |
| Note 1: The value of b2-Threshold1 is defined in Table A.12.4.2.1.1-3  Note 2: The value of b2-Threshold2NR is defined in Table A.12.4.2.1.1-4 | | | | | |

Table A.12.4.2.1.1-3: 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 | 1 | |
| Duplex mode |  | 1 | FDD | |
| 2 | TDD | |
| TDD special subframe configurationNote1 |  | 2 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2 | -77 for RSRP | |
|  | 1, 2 | [TBDfor RSRQ] | |
| dB | 1, 2 | [TBD for SINR] | |
| PBCH\_RA | dB | 1, 2 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2 | -104 | |
| Ês/Noc | dB | 1, 2 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: 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.12.4.2.1.1-4: 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 | 2 | |
| TDD configuration |  | 1, 2 | TDDConf.1.1 CCA | |
| BWchannel | MHz | 1, 2 | 40: NRB,c = 106 | |
| PCCA\_DL |  | 1, 2 | [TBD] | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 2 | SMTC.1 | |
| DBT window configuration |  | 1, 2 | DBT.1 | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2 | -98 for SS-RSRP | |
|  | 1, 2 | [69for SS-RSRQ] | |
| dB | 1, 2 | [54 For SS-SINR] | |
| EPRE ratio of PSS to SSS |  | 1, 2 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |
| Note2 | dBm/15kHz | 1, 2 | -98 | |
| Note2 | dBm/SCS | 1, 2 | -95 | |
| SS-RSRP Note 3,5 | dBm/SCS | 1, 2 | -Infinity | -88 |
| Note 5 | dB | 1, 2 | -Infinity | 7 |
| Note 5 | dB | 1, 2 | -Infinity | 7 |
| IoNote3 | dBm/38.16MHz | 1, 2 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, | 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.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | |

##### A.12.4.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index. Tidentify\_irat\_cca\_without\_index is defined in defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.12.4.2.2 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

##### A.12.4.2.2.1 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 on a carrier frequency with CCA. The test parameters are given in Tables A.12.4.2.2.1-1, A.12.4.2.2.1-2, A.12.4.2.2.1-3 and A.12.4.2.2.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.12.4.2.2.1-2 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.12.4.2.2.1-2 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 UE is tested when MeasTriggerQuantity is configured as RSRP, RSRQ and SINR for each test. 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.12.4.2.2.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD |
| 2 | LTE TDD; NR with CCA: 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.12.4.2.2.1-2: 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 | 1 | | | | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number |  | 1, 2 | 1 | | | | One FR1 NR carrier frequency under CCA is used. |
| Active cell |  | 1, 2 | E-UTRA cell 1 (PCell) | | | | E-UTRA cell 1 is on E-UTRA RF channel  number 1. |
| DL CCA model |  |  | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  |  | As specified in clause A.3.20.2.2 | | | |  |
| Neighbour cell |  | 1, 2 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2 | 0 | | 4 | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset |  | 1, 2 | 39 | | 19 | | As specified in TS 36.331 [16]. |
| b2-Threshold1 | dBm | 1, 2 | Note 1 | | | | E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | dBm | 1, 2 | Note 2 | | | | SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 2 for event B2 [16] |
| Hysteresis | dB | 1, 2 | 0 | | | |  |
| CP length |  | 1, 2 | Normal | | | |  |
| TimeToTrigger | s | 1, 2 | 0 | | | |  |
| Filter coefficient |  | 1, 2 | 0 | | | | L3 filtering is not used |
| DRX |  | 1, 2 | DRX.9 | DRX.10 | DRX.9 | DRX.10 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | 1, 2 | 3μs | | | | Synchronous cells. |
| T1 | s | 1, 2 | 5 | | | |  |
| T2 | s | 1, 2 | ≥Tidentify\_irat\_cca\_without\_index | | | | Tidentify\_irat\_cca\_without\_index­ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133 |
| Note 1: The value of b2-Threshold1 is defined in Table A.12.4.2.1.1-3  Note 2: The value of b2-Threshold2NR is defined in Table A.12.4.2.1.1-4 | | | | | | | |

Table A.12.4.2.2.1-3: 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 | 1 | |
| Duplex mode |  | 1 | FDD | |
| 2 | TDD | |
| TDD special subframe configurationNote1 |  | 2 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2 | -77 for RSRP | |
|  | 1, 2 | [TBD for RSRQ] | |
| dB | 1, 2 | [TBD for SINR] | |
| PBCH\_RA | dB | 1, 2 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2 | -104 | |
| Ês/Noc | dB | 1, 2 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: 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.12.4.2.2.1-4: 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 | 1 | |
| TDD configuration |  | 1, 2 | TDDConf.1.1 CCA | |
| BWchannel | MHz | 1, 2 | 40: NRB,c = 106 | |
| PCCA\_DL |  |  | [TBD] | |
| CCA model |  | 1, 2 | TBD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 2 | SMTC.1 | |
| DBT window configuration |  | 1, 2 | DBT.1 | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2 | -98 for SS-RSRP | |
|  |  | 1, 2 | [TBD for SS-RSRQ] | |
| dB | 1, 2 | [TBD For SS-SINR] | |
| EPRE ratio of PSS to SSS |  | 1, 2 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |
| Note2 | dBm/15kHz | 1, 2 | -98 | |
| Note2 | dBm/SCS | 1, 2 | -95 | |
| SS-RSRP Note 3,5 | dBm/SCS | 1, 2 | -Infinity | -88 |
| Note 5 | dB | 1, 2 | -Infinity | 7 |
| Note 5 | dB | 1, 2 | -Infinity | 7 |
| IoNote3 | dBm/38.16MHz | 1, 2 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, | 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.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | |

##### A.12.4.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_without\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.12.4.2.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

##### A.12.4.2.3.1 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 on a carrier frequency with CCA. The test parameters are given in Tables A.12.4.2.3.1-1, A.12.4.2.3.1-2, A.12.4.2.3.1-3 and A.12.4.2.3.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.12.4.2.3.1-2 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.12.4.2.3.1-2 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. The UE is tested when MeasTriggerQuantity is configured as RSRP, RSRQ and SINR for each test. 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.12.4.2.3.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD |
| 2 | LTE TDD; NR with CCA: 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.12.4.2.3.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| E-UTRA RF Channel Number |  | 1, 2 | 1 | | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number |  | 1, 2 | 1 | | One FR1 NR carrier frequency under CCA is used. |
| DL CCA model |  |  | As specified in clause A.3.20.2.1 | |  |
| UL CCA model |  |  | As specified in clause A.3.20.2.2 | |  |
| Active cell |  | 1, 2 | E-UTRA cell 1 (PCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2 | NR cell 2 | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2 | 0 | 4 | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset |  | 1, 2 | 39 | 19 | As specified in TS 36.331 [16]. |
| b2-Threshold1 | dBm | 1, 2 | Note 1 | | E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | dBm | 1, 2 | Note 2 | | SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 2 for event B2 [16] |
| Hysteresis | dB | 1, 2 | 0 | |  |
| CP length |  | 1, 2 | Normal | |  |
| TimeToTrigger | s | 1, 2 | 0 | |  |
| Filter coefficient |  | 1, 2 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | 1, 2 | 3μs | | Synchronous cells. |
| T1 | s | 1, 2 | 5 | |  |
| T2 | s | 1, 2 | ≥ Tidentify\_irat\_cca\_with\_index | ≥ Tidentify\_irat\_cca\_with\_index | Tidentify\_irat\_cca\_with\_index is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133 |
| Note 1: The value of b2-Threshold1 is defined in Table A.12.4.2.3.1-3  Note 2: The value of b2-Threshold2NR is defined in Table A.12.4.2.3.1-4 | | | | | |

Table A.12.4.2.3.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 with SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2 | 1 | |
| Duplex mode |  | 1 | FDD | |
| 2 | TDD | |
| TDD special subframe configurationNote1 |  | 2 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2 | -77 for RSRP | |
|  | 1, 2 | [TBD for RSRQ] | |
| dB | 1, 2 | [TBD for SINR] | |
| PBCH\_RA | dB | 1, 2 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2 | -104 | |
| Ês/Noc | dB | 1, 2 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: 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.12.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| NR RF Channel Number |  | 1, 2 | 1 | |
| TDD configuration |  | 1, 2 | TDDConf.1.1 CCA | |
| BWchannel | MHz | 1, 2 | 40: NRB,c = 106 | |
| PCCA\_DL |  |  | [TBD] | |
| CCA model |  | 1, 2 | TBD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 2 | SMTC.1 | |
| DBT window configuration |  | 1, 2 | DBT.1 | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2 | -98 for SS-RSRP | |
|  |  | 1, 2 | [TBD for SS-RSRQ] | |
| dB | 1, 2 | [TBD For SS-SINR] | |
| EPRE ratio of PSS to SSS |  | 1, 2 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |
| Note2 | dBm/15kHz | 1, 2 | -98 | |
| Note2 | dBm/SCS | 1, 2 | -95 | |
| SS-RSRP Note 3,5 | dBm/SCS | 1, 2 | -Infinity | -88 |
| Note 5 | dB | 1, 2 | -Infinity | 7 |
| Note 5 | dB | 1, 2 | -Infinity | 7 |
| IoNote3 | dBm/38.16MHz | 1, 2 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, | 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.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | |

##### A.12.4.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.12.4.2.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

##### A.12.4.2.4.1 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 on a carrier frequency with CCA. The test parameters are given in Tables A.12.4.2.4.1-1, A.12.4.2.4.1-2, A.12.4.2.4.1-3 and A.12.4.2.4.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.12.4.2.4.1-2 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.12.4.2.4.1-2 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.12.4.2.4.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR1

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD |
| 2 | LTE TDD; NR with CCA: 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.12.4.2.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
|  |  |  | Test 1 | Test 2 | Test 3 | Test |  |
| E-UTRA RF Channel Number |  | 1, 2 | 1 | | | | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number |  | 1, 2 | 1 | | | | One FR1 NR carrier frequency under CCA is used. |
| DL CCA model |  |  | As specified in clause A.3.20.2.1 | | | |  |
| UL CCA model |  |  | As specified in clause A.3.20.2.2 | | | |  |
| Active cell |  | 1, 2 | E-UTRA cell 1 (PCell) | | | | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 1. |
| Gap Pattern Id |  | 1, 2 | 0 | | 4 | | As specified in clause Table 8.1.2.1-1 of TS 36.133 [15]. |
| Measurement gap offset |  | 1, 2 | 39 | | 19 | | As specified in TS 36.331 [16]. |
| b2-Threshold1 | dBm | 1, 2 | Note 1 | | | | E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16] |
| b2-Threshold2NR | dBm | 1, 2 | Note 2 | | | | SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 2 for event B2 [16] |
| Hysteresis | dB | 1, 2 | 0 | | | |  |
| CP length |  | 1, 2 | Normal | | | |  |
| TimeToTrigger | s | 1, 2 | 0 | | | |  |
| Filter coefficient |  | 1, 2 | 0 | | | | L3 filtering is not used |
| DRX |  | 1, 2 | DRX.9 | DRX.10 | DRX.9 | DRX.10 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | 1, 2 | 3μs | | | | Synchronous cells. |
| T1 | s | 1, 2 | 5 | | | |  |
| T2 | s | 1, 2 | ≥Tidentify\_irat\_cca\_with\_index | | | | Tidentify\_irat\_cca\_with\_index­ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133 |
| Note 1: The value of b2-Threshold1 is defined in Table A.12.4.2.4.1-3  Note 2: The value of b2-Threshold2NR is defined in Table A.12.4.2.4.1-4 | | | | | | | |

Table A.12.4.2.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 with SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 | |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2 | 1 | |
| Duplex mode |  | 1 | FDD | |
| 2 | TDD | |
| TDD special subframe configurationNote1 |  | 2 | 6 | |
| TDD uplink-downlink configurationNote1 |  | 2 | 1 | |
| BWchannel | MHz | 1, 2 | 5 MHz: NRB,c = 25  10 MHz: NRB,c = 50  20 MHz: NRB,c = 100 | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.7 FDD  10 MHz: R.3 FDD  20 MHz: R.6 FDD | |
|  |  | 2 | 5 MHz: R.4 TDD  10 MHz: R.0 TDD  20 MHz: R.3 TDD | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1 | 5 MHz: R.11 FDD  10 MHz: R.6 FDD  20 MHz: R.10 FDD | |
|  |  | 2 | 5 MHz: R.11 TDD  10 MHz: R.6 TDD  20 MHz: R.10 TDD | |
| OCNG PatternsNote2 |  | 1 | 5 MHz: OP.20 FDD  10 MHz: OP.10 FDD  20 MHz: OP.17 FDD | |
|  |  | 2 | 5 MHz: OP.9 TDD  10 MHz: OP.1 TDD  20 MHz: OP.7 TDD | |
| b2-Threshold1 | dBm | 1, 2 | -77 for RSRP | |
|  | 1, 2 | [TBD for RSRQ] | |
| dB | 1, 2 | [TBD for SINR] | |
| PBCH\_RA | dB | 1, 2 | 0 | |
| PBCH\_RB |  |  |  | |
| PSS\_RA |  |  |  | |
| SSS\_RA |  |  |  | |
| PCFICH\_RB |  |  |  | |
| PHICH\_RA |  |  |  | |
| PHICH\_RB |  |  |  | |
| PDCCH\_RA |  |  |  | |
| PDCCH\_RB |  |  |  | |
| PDSCH\_RA |  |  |  | |
| PDSCH\_RB |  |  |  | |
| OCNG\_RANote3 |  |  |  | |
| OCNG\_RBNote3 |  |  |  | |
| NocNote4 | dBm/15kHz | 1, 2 | -104 | |
| Ês/Noc | dB | 1, 2 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2 | 1x2 Low | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: 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.12.4.2.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
|  |  |  | T1 | T2 |
| NR RF Channel Number |  | 1, 2 | 1 | |
| TDD configuration |  | 1, 2 | TDDConf.1.1 CCA | |
| BWchannel | MHz | 1, 2 | 40: NRB,c = 106 | |
| PCCA\_DL |  |  | TBD | |
| CCA model |  | 1, 2 | TBD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 2 | TBD | |
| DBT window configuration |  | 1, 2 | TBD | |
| SSB configuration for semi-static channel access |  | 1, 2 | SSB.1 CCA | |
| SSB configuration for dynamic channel access |  | 1, 2 | SSB.2 CCA | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2 | -98 for SS-RSRP | |
|  |  | 1, 2 | [TBD for SS-RSRQ] | |
| dB | 1, 2 | [TBD For SS-SINR] | |
| EPRE ratio of PSS to SSS |  | 1, 2 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |
| Note2 | dBm/15kHz | 1, 2 | -98 | |
| Note2 | dBm/SCS | 1, 2 | -95 | |
| SS-RSRP Note 3,5 | dBm/SCS | 1, 2 | -Infinity | -88 |
| Note 5 | dB | 1, 2 | -Infinity | 7 |
| Note 5 | dB | 1, 2 | -Infinity | 7 |
| IoNote3 | dBm/38.16MHz | 1, 2 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2 | ETU70 | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, | 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.  NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. | | | | |

##### A.12.4.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than Tidentify\_irat\_cca\_with\_index ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.12.4.2.5 RSSI measurement reporting

##### A.12.4.2.5.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the inter-RAT RSSI measurement reporting requirements in TS 36.133 [15, Section 8.1.2.4.21A.1.5].

##### A.12.4.2.5.2 Test parameters

In the test, the UE is configured to perform inter-RAT RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.12.4.2.5.2-1. There is one cell in the test: Cell 1 is E-UTRAN PCell on a licensed band. Prior to the start of the time duration T1, the UE is connected to Cell 1. The RSSI measurement is performed on an inter-RAT carrier frequency under CCA. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.12.4.2.5.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.12.4.2.5.2-2: General test parameters.

Editor’s note: Table TBD

#### A.12.4.2.6 Channel occupancy measurement reporting

##### A.12.4.2.6.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the inter-RAT channel occupancy measurement reporting requirements in TS 36.133 [15, Section 8.1.2.4.21A.1.6].

##### A.12.4.2.6.2 Test parameters

In the test, the UE is configured to perform inter-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.12.4.2.6.2-1. There is one cell in the test: Cell 1 which is E-UTRAN PCell on a licensed band. Prior to the start of the time duration T1, the UE is connected to Cell 1. The channel occupancy measurement is performed on an inter-RAT carrier frequency under CCA. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.12.4.2.6.2-1: Supported test configurations.

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: 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 above. | |

Table A.12.4.2.6.2-2: General test parameters.

Editor’s note: Table is TBD

## A.12.5 Measurement performance

### A.12.5.1 E-UTRAN−NR SFTD

A.12.5.1.1 Inter-RAT SFTD accuracy with NR target cell under CCA

A.12.5.1.1.1 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 9.1.27 in TS 36.133 [15] for inter-RAT SFTD measurements between E-UTRA PCell and NR target cell under CCA.

A.12.5.1.1.2 Test Environment

Supported test configurations are shown in Table A.12.5.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is inter-RAT NR target cell under CCA. The test parameters of Cell 1 are given in clause A.12.5.1.1.2-2. The test parameters of Cell 2 are given in Table A.12.5.1.1.2-3. The SFTD between PCell and NR target cell shall be set by the test equipment to one of the time differences in Table A.12.5.1.1.2-4.

**Table A.12.5.1.1.2-1: Supported test configurations for SFTD accuracy with NR target cell under CCA**

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD  NR with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD  NR with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.12.5.1.1.2-2: Test parameters for inter-RAT SFTD accuracy with NR target cell under CCA (Cell 1)**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** |
| E-UTRA RF Channel Number |  | 1 |
| 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 | 0 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote3 | dB |
| OCNG\_RBNote3 | dB |
| NocNote4 | dBm/15 kHz | -104 |
| Ês/Noc | dB | -3 |
| Ês/Iot | dB | -3 |
| RSRP Note5 | dBm/15 kHz | -107 |
| SCH\_RP Note5 | dBm/15 kHz | -107 |
| Io Note5 | dBm/Ch BW | -74.45  +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 [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: Es/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | |

**Table A.12.5.1.1.2-3: Test parameters for inter-RAT SFTD accuracy with NR target cell under CCA (Cell 2)**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** |
| Duplex mode |  | TDD |
| TDD Configuration |  | TDDConf.2.1 |
| BWchannel | MHz | 40: NRB,c = 106 |
| DL CCA model |  | [As specified in clause A.3.20.2.1] |
| DL CCA probability PCCA |  | TBD |
| PDSCH Reference measurement channel |  | [SR.2.1 TDD] |
| RMSI CORESET Reference Channel |  | [CR.2.1 TDD] |
| RMC CORESET Reference Channel |  | [CCR.2.1 TDD] |
| SSB configuration |  | [SSB.2 FR1] |
| SMTC configuration |  | [SMTC.1] |
| DBT window configuration |  | TBD |
| DL BWP configuration |  | DLBWP.1.1 |
| UL BWP configuration |  | ULBWP.1.1 |
| OCNG Patterns |  | OP.1 |
| EPRE ratio of PSS to SSS | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Noc Note2 | dBm/15kHz | -104 |
| Noc Note2 | dBm/SSB SCS | -101 |
| Ês/Iot | dB | -3 |
| Ês/Noc | dB | -3 |
| SS-RSRP Note3 | dBm/SCS | -104 |
| Io Note3 | dBm/38.16 MHz | -68.18 |
| Propagation condition |  | AWGN |
| Antenna configuration |  | 1x2 |
| 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 in slots with downlink transmission bursts.  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: 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.12.5.1.1.2-4: Timing offsets for inter-RAT SFTD accuracy test with NR target cell under CCA**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **SFN offset between PCell and NR neighbor cell** | **Frame boundary offset between PCell and NR neighbour cell (Ts)** |
| 1 | 100 | -122000 |
| 2 | 300 | -60540 |
| 3 | 500 | 1000 |
| 4 | 700 | 62540 |
| 5 | 900 | 124000 |

A.12.5.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and inter-RAT NR target cell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

### A.12.5.2 E-UTRAN−NR SS-RSRP

### A.12.5.3 E-UTRAN−NR SS-RSRQ

### A.12.5.4 E-UTRAN−NR SS-SINR

### A.12.5.5 E-UTRAN−NR RSSI

### A.12.5.6 E-UTRAN−NR channel occupancy

**--- end of change 2 ---**

**--- start of change 3 ---**

## B.2.8 Conditions for NR intra-frequency measurements under CCA

This clause defines the following conditions for NR intra-frequency measurements unde CCA and corresponding procedures performed based on SSBs: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.8-1 for NR cells under CCA.

Table B.2.8-1: Conditions for intra-frequency measurements under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
| dBm / SCSSSB | | dB |
| SCSSSB = 15 kHz | SCSSSB = 30 kHz |
| Conditions | NR\_TDD\_FR1\_I | TBD | TBD | ≥ -6 |
| NOTE 1: NR operating band groups are as defined in clause 3.5.2. | | | | |

## B.2.9 Conditions for NR inter-frequency measurements under CCA

This clause defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.9-1 for NR cells under CCA.

Table B.2.9-1: Conditions for inter-frequency measurements under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
| dBm / SCSSSB | | dB |
| SCSSSB = 15 kHz | SCSSSB = 30 kHz |
| Conditions | NR\_TDD\_FR1\_I | TBD | TBD | ≥ -4 |
| NOTE 1: NR operating band groups are as defined in clause 3.5.2. | | | | |

## B.2.10 Conditions for NR L1-RSRP reporting under CCA

### B.2.10.1 Conditions for SSB based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on SSBs under CCA: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.10.1-1 for NR cells under CCA.

Table B.2.10.1-1: Conditions for SSB based L1-RSRP measurements under CCA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
| dBm / SCSSSB | | dB |
| SCSSSB = 15 kHz | SCSSSB = 30 kHz |
| Conditions | NR\_TDD\_FR1\_I | TBD | TBD | ≥ -3 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

**--- end of change 3 ---**