**3GPP TSG-RAN4 Meeting #100-e *R4-2115453***

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

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.133** | **CR** | **2200** | **rev** | **-** | **Current version:** | **15.14.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Big CR to TS 38.133: NR\_newRAT-Perf maintenance Part 1 (Rel-15) | | | | | | | | | |
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| ***Source to WG:*** | MCC, Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Perf | | | | |  | ***Date:*** | | | 2021-08-30 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-15 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This big CRs merge the mutiple endorsed draft CRs. The reason for change in each endorsed draft CR is copied below.   * R4-2111849 Clarification of SNR values in FR2 BFD-LR Test cases   <Reason for change>  The assumptions used when choosing the SNR levels for BFD-LR test cases are not stated in the test cases. The missing information prevents RAN5 from designing the test cases reliably including uncertainties.  When designing the BFD-LR test cases the Noc level was chosen to be 6dB above the UE internal noise, giving a maximum of 1dB degradation in SNR. The SNRs, which need to be decisively above or below Qin/Qout, were originally simulated in RAN4 at UE baseband.  For SNRs intended to be **above** Qin/Qout, the applied SNR was increased by 1dB, to counteract the 1dB degradation and meet the original SNR target at UE baseband.  For SNRs intended to be **below** Qin/Qout, the applied SNR was not changed, as the 1dB degradation can only make the baseband SNR further below the original SNR target at UE baseband. If the applied SNR was increased, a UE with very good (low) internal noise might not be decisively below Qout.   * R4-2111859 Update NR PSCell Addition and Release Delay RRM Test cases   <Reason for change>  FR2 PSCell Addition and Release delay Test cases cannot be implemented reliably with current parameter values, whilst still meeting side conditions.  For test cases with one cell in LTE or FR1, and the other cell in NR FR2, the LTE or FR1 cell should be defined by referring to A.3.7.   * R4-2111865 Update inter-frequency FR1-FR2 SS-RSRP measurement accuracy Test cases   <Reason for change>  a) Test 1 of FR1-FR2 SS-RSRP measurement accuracy Test cases cannot be implemented reliably in RAN5 with current parameter values, whilst still meeting side conditions. In Test 2, the band-dependent Es level refers to Table B.2.3-2, but does not indicate that the Spherical Coverage value is selected.  b) Test case parameter “Data RBs allocated” is missing for the FR2 Cell.  c) The SSB configuration chosen is for two SSBs, but only one SSB is needed for the test purpose.   * R4-2111889 Correction of SSB configuration for interruption test cases in FR2   <Reason for change>  SSB configuration is defined as SSB.1 FR2 in Table A.5.5.2.1.1-3 and A.5.5.2.2.1-3. But it should be SSB.3 FR2 if the number of SSBs per SS-burst should be aligned (i.e. 1 SSB) with FR1 interruption TCs (A.4.5.2.1 and A.4.5.2.2).   * R4-2115247 Draft CR to specify the number of data RBs allocated   <Reason for change>  1) Based on the comment during the previous meeting #99-e, there are still TCs which need to specify the number of data RBs allocated. (Refer to the comment to the CR R4-2108883 in topic summary #202 R4-2108371)  2) In table A.7.3.2.2.1.1-2 and A.7.3.2.2.2.1-2, NRB,c for BWchannel was mistakenly defined as 24. 24RB should be the Data RB number and NRB,c for BWchannel should be 66.  3) Description of the parameter for BWchannel in Table A.7.3.2.2.1.1-2 is mistakenly arranged.  4) SS\_RSRP should be SSB\_RP in Table A.5.5.2.x.1-4   * R4-2115250 Definition of generic channel BW configurations for RRM CA tests   <Reason for change>  As raised the issue in R4-2108849, current RRM test configurations for NR cell are defined based on a fixed combination of sub-carrier spacing and channel bandwidth. However due to the increase of CA band combinations in FR1, we noticed that there are band combinations which cannot be configured based on the current RRM test configurations. e.g. CA\_n71B, CA\_n41C, etc.  To solve this issue, we need to generalize the description of channel bandwidth in test configurations. For channel BW other than 10 MH for SSB SCS 15 kHz or 40 MHz for SSB SCS 30 kHz, define test parameters as follows.  - Define channel bandwidth with “≥” mark in the test configuration tables to add flexibility to the CA bandwidth combination  - Introduce a new parameter “BWoccupied” which is the actual BW allocation in each test parameter table (confined with 10 MHz or 40 MHz)  - Configure PDSCH RMC with the same number of RBs as 10 MHz for 15 kHz SSB SCS or 40 MHz for 30 kHz SSB SCS  - Configure CORESET for RMSI and RMC scheduling with same configurations as CBW of 10 MHz for 15 kHz SSB SCS or 40 MHz for 30 kHz SSB SCS  - Fill in 10 MHz or 40 MHz channel BW with OCNG  - Confine also the bandwidth of Noc within BWoccupied.   * R4-2115252 Update FR2 SCell Activation and Deactivation Delay Test cases   <Reason for change>  a) Test cases A.4.5.3.3.1, A.5.5.3.5 and A.7.5.3.2 contain a contradiction during T1, where the SCell is stated to be powered off, but the OTA parameters table specify the SCell as on during all time periods.  b) Test case parameter “Data RBs allocated” is missing   * R4-2115255 CR to the propagation condition of NR cell for InterRAT test cases   <Reason for change>  Propargation condition for NR cell is ambiguous in TC A.6.6.3.1.1 and A.6.6.3.2.1. (No doppler frequency specified.)  Propagation condition for NR cell is mistakenly defined as LTE condition (ETU70) in TC A.8.4.2.1.1, A.8.4.2.2.1, A.8.4.2.3.1 and A.8.4.2.4.1. In addiion, it is better to align propagation condition same as other FR1 TCs (i.e. TDL-C 300ns 100Hz).  In FR2 TC A.8.4.2.5, propagation condition is missing. AWGN should be the right one (as in TCs A.8.4.2.5/7/8).   * R4-2115256 Introduction of new BWP definition for FR2 SSB SCS240kHz conditions   <Reason for change>  Considering the size of BWP1.2/1.3(32RBs) and Data RBs(48RB) for FR2 SSB SCS 240kHz, the resources are inconsistent.  Clarification is needed with the description of SCS (data SCS or SSB SCS)   * R4-2115251 Draft CR to update RMC and SCell SSB burst position for A.6.5.2.1   <Reason for change>  The interruption can be only observed as DTX caused by PDSCH decode failure or PUSCH/PUCCH transmission failure. Thus any of PDSCH or PUSCH need to be scheduled on concerning slots for interuption measurement. As discussed at R4-2108850 and agreed in the WF (R4-2108038), RMC for TDD15KHz and SSB burst position of SCell will be updated. | | | | | | | | |
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| ***Summary of change:*** | | The summary of change in each endorsed draft CR is copied below.   * R4-2111849 Clarification of SNR values in FR2 BFD-LR Test cases   <Summary of change>  Add notes specifying which SNR values have been increased to allow degradation from applied SNR to UE baseband. Only the set q0 SNR values need to be considered as they are set relative to Qout. For set q1, SSB\_RP is the critical value and is not directly affected by UE internal noise.  The note on SNR levels for BFD-LR test cases follows the same principle as for RLM Test cases, whch was agreed at RAN4#96-e in R4-2010779.   * R4-2111859 Update NR PSCell Addition and Release Delay RRM Test cases   <Summary of change>  a) Define “Data RBs allocated” to be 48 for the FR2 cell, and change the FR2 cell OCNG to OP.3 (same RBs as CORESET). This aligns with the 48RBs RMSI CORESET Reference Channel, 48RBs Control Channel and PDSCH Reference Channels occupying the same 48RBs as the CORESET (these Ref channels were updated in R4-2108199 agreed at RAN4#99-e).  b) Update the FR2 cell to use SSB Es only at -81dBm/SCS (no applied noise). This allows the RAN5 test case to meet both Es/Iot at UE baseband and Io side conditions, including the effect of Test system uncertainties.  c) Change the B1/A4 threshold to -118dBm to allow for spherical coverage variations and UE gain range, to make the test verdict predictable.  d) Refer to A.3.7.2.2 for Test cases using LTE(E-UTRA) PCell, and to A.3.7A for Test cases using FR1 PCell, and remove Cell 1 parameter values from the test cases.  e) Correct typos for time periods and other minor errors.  Test cases affected are:   * FR2 PSCell Add/Release Delay test cases A.5.5.7.1, A.7.5.7.1, A.7.5.7.2 * R4-2111865 Update inter-frequency FR1-FR2 SS-RSRP measurement accuracy Test cases   <Summary of change>  a) Update the OTA parameters table with the following changes and update the notes:   * For Test 1 increase Es/Noc to +5dB, and use 24 Data RBs * For Test 2 specify Spherical Coverage Es level in Table B.2.3-2 * Clean up/format parameters similar to other SS-RSRP Test cases   The test coverage is satisfied by using high Es/Iot and the maximum Io level for Test 1, and the lowest Es/Iot with (band-dependent) minimum SSB\_RP level for Test 2.  b) Specify test case parameter “Data RBs allocated” for the FR2 cell, and select the OCNG pattern to align.  c) Specify SSB.3 FR2, which has one SSB.   * R4-2111889 Correction of SSB configuration for interruption test cases in FR2   <Summary of change>  Corrected SSB configuration from SSB.1 FR2 to SSB.3 FR2.   * R4-2115247 Draft CR to specify the number of data RBs allocated   <Summary of change>  1) The number of Data RBs allocated is now defined in each test case, so the correct Io can be calculated. BWchannel definition is also added where it is missing.  2) In table A.7.3.2.2.1.1-2 and A.7.3.2.2.2.1-2, NRB,c for BW channel is corrected from 24 to 66. And Data RBs are defined as 24.  3) Corrected arrangement of values for BWchannel in Table A.7.3.2.2.1.1-2.  4) In Table A.5.5.2.x.1-4, parameter SS\_RSRP and Note 2 is corrected to SSB\_RP   * R4-2115250 Definition of generic channel BW configurations for RRM CA tests   <Summary of change>   1. Changed description of channel bandwidth in PDSCH RMC (A.3.1.1), CORESET for RMSI scheduling (A.3.1.2), and CORESET for RMC scheduling (A.3.1.3) to generalize the CBW that accommodates any bandwidths wider than or equal to 10 MHz or 40 MHz. 2. Added a condition to Note 2 in OCNG pattern 1 (A.3.2.1.1) to confine OCNG bandwidth within BWoccupied. 3. Modified test configuration tables in each test case and added “≥” before channel bandwidth to cover any BW wider than 10 MHz or 40 MHz. Also added note 2. 4. Replaced the description of BWchannel by note and indicated to refer to Table 5.3.2-1 in TS 38.101-1 to generalize the bandwidth in cell specific test parameter tables. 5. Added a parameter “BWoccupied” in cell specific test parameter tables. 6. Added notes in cell specific test parameter tables to confine actual transmission bandwidth within either 10 MHz (52RBs) or 40 MHz (106 RBs) also to clarify that Io is independent of the BWchannel configured. 7. Modified note 2 in cell specific test parameter tables to also confine actual bandwidth of Noc within BWoccupied. 8. Added the definition of FC and FC,low in clause 3.2.  * R4-2115252 Update FR2 SCell Activation and Deactivation Delay Test cases   <Summary of change>  a) For A.5.5.3.5 and A.7.5.3.2, update the OTA parameters table to specify the SCell as off during T1, and on during T2 and T3. Clean up the tables to remove redundant notes, and re-format A.7.5.3.2.1-3 similar to other test cases with Cell 1 to the left, to avoid confusion.  In A.4.5.3.3.1, A.5.5.3.5.1 and A.7.5.3.2.1 Test Purpose and Environment, remove the confusing text about Cell 2/3 being the same level as Cell 1/2, and remove “same as” text for tables which are individually defined for each test case.  b) Add test case parameter “Data RBs allocated”   * R4-2115255 CR to the propagation condition of NR cell for InterRAT test cases   <Summary of change>  Changed the propagation condition of NR cell to TDL-C 300ns 100Hz.  In FR2 TC A.8.4.2.5, AWGN Propagation condition added.   * R4-2115256 Introduction of new BWP definition for FR2 SSB SCS240kHz conditions   <Summary of change>  Added new condiftion for SSB SCS 240kHz.  Added a clarification for SCS definitions.   * R4-2115251 Draft CR to update RMC and SCell SSB burst position for A.6.5.2.1   <Summary of change>  ・Defined new RMC of SR.1.2 TDD for SCS15kHz TDD which schedules PDSCH even at special slots.  ・Changed SSB burst position on SCell to at even SFN(SSB.5 FR1 or SSB.6 FR1)  ・SMTC for monitoring SCell SSB was updated to cover the new SSB burst position(SMTC.4) | | | | | | | | |
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| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are coppied below.   * R4-2111849 Clarification of SNR values in FR2 BFD-LR Test cases   <Consequences if not approved>  RAN5 would not be able to implement RLM test cases in a way that provides the intended SNR at UE baseband. This is critical for the test case to give a reliable verdict to and avoid failing a good UE.   * R4-2111859 Update NR PSCell Addition and Release Delay RRM Test cases   <Consequences if not approved>  a) b) and c): FR2 PSCell Addition and Release delay Test cases could not be implemented by RAN5.  d) Test cases could not be implemented on available test systems, as it is not practical to specify a precise downlink level for a conducted E-UTRA or FR1 signal, in a test system designed for FR2 over-the-air operation.  e) Contradictions would remain, making test implementation ambiguous.   * R4-2111865 Update inter-frequency FR1-FR2 SS-RSRP measurement accuracy Test cases   <Consequences if not approved>  Test cases could not be implemented by RAN5.   * R4-2111889 Correction of SSB configuration for interruption test cases in FR2   <Consequences if not approved>  Corrected SSB configuration from SSB.1 FR2 to SSB.3 FR2.   * R4-2115247 Draft CR to specify the number of data RBs allocated   < Consequences if not approved >  It would not be clear how to calculate the Io, and the UE might be tested outside a critical side condition.   * R4-2115250 Definition of generic channel BW configurations for RRM CA tests   <Consequences if not approved>  RRM test cases cannot cover specific CA band combinations which do not support 10 MHz or 40 MHz channel bandwidth.   * R4-2115252 Update FR2 SCell Activation and Deactivation Delay Test cases   <Consequences if not approved>  Test cases could not be implemented by RAN5.   * R4-2115255 CR to the propagation condition of NR cell for InterRAT test cases   <Consequences if not approved>  Test condition is not appropriate.   * R4-2115256 Introduction of new BWP definition for FR2 SSB SCS240kHz conditions   <Consequences if not approved>  Unable to allocate resources correctly.   * R4-2115251 Draft CR to update RMC and SCell SSB burst position for A.6.5.2.1   <Consequences if not approved>  Interruption cannot be evaluated correctly. | | | | | | | | |
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| ***Clauses affected:*** | | * R4-2111849 Clarification of SNR values in FR2 BFD-LR Test cases   <clauses affected>  Tables A.5.5.5.1.1-3, A.5.5.5.2.1-3, A.5.5.5.3.1-3, A.5.5.5.4.1-3, A.5.5.5.5.1-3.  Tables A.7.5.5.1.1-3, A.7.5.5.2.1-3, A.7.5.5.3.1-3, A.7.5.5.4.1-3, A.7.5.5.5.1-3.   * R4-2111859 Update NR PSCell Addition and Release Delay RRM Test cases   <clauses affected>  Tables A.5.5.7.1.1-2, A.5.5.7.1.1-3, A.5.5.7.1.1-4. Clause A.5.5.7.1.2  Tables A.7.5.7.1.1-2, A.7.5.7.1.1-3, add A.7.5.7.1.1-4  Tables A.7.5.7.2.1-2, A.7.5.7.2.1-3, add A.7.5.7.2.1-4   * R4-2111865 Update inter-frequency FR1-FR2 SS-RSRP measurement accuracy Test cases   <clauses affected>  Tables A.5.7.1.3.2-1, A.5.7.1.3.2-2, A.7.7.1.3.2-1, A.7.7.1.3.2-2.   * R4-2111889 Correction of SSB configuration for interruption test cases in FR2   <Clauses affected>  A.5.5.2.1.1, A.5.5.2.2.1   * R4-2115247 Draft CR to specify the number of data RBs allocated   < clauses affected >  A.5.5.2.1 – 6, A.5.5.5.3 – 5, A.5.6.2.5 – 8, A.5.6.3.3 – 4, A.7.1.1.1, A.7.3.1.1 - 3, A.7.3.2.2 - 3, A.7.5.2.1, A.7.5.5.3 - 5, A.7.5.8.1 - 2, A.7.6.2.5 – 8, A.7.7.2.1 - 2, A.7.7.3.1 - 2   * R4-2115250 Definition of generic channel BW configurations for RRM CA tests   <Clauses affected>  3.2, A.3.1.1, A.3.1.2, A.3.1.3, A.3.2.1.1, A.4.5.2.3, A.4.5.2.4, A.4.5.3.1, A.4.5.4.1, A.4.5.6.1.2, A.6.5.2.1, A.6.5.3.1, A.6.5.4.1, A.6.5.6.1.1   * R4-2115252 Update FR2 SCell Activation and Deactivation Delay Test cases   <Clauses affected>  Tables A.5.5.3.1.1-3, A.5.5.3.1.1-4, A.5.5.3.2.1-2, A.5.5.3.2.1-3, A.5.5.3.5.1-3, A.5.5.3.5.1-4, A.7.5.3.1.1-3, A.7.5.3.1.1-4, A.7.5.3.2.1-2, A.7.5.3.2.1-3.  Clauses A.4.5.3.3.1, A.5.5.3.5.1, A.7.5.3.2.1.   * R4-2115255 CR to the propagation condition of NR cell for InterRAT test cases   <Clauses affected>  A.6.6.3.1.1, A.6.6.3.2.1  A.8.4.2.1.1, A.8.4.2.2.1, A.8.4.2.3.1, A.8.4.2.4.1, A.8.4.2.5.1   * R4-2115256 Introduction of new BWP definition for FR2 SSB SCS240kHz conditions   <Clauses affected>  A.3.9.2, A.3.9.3   * R4-2115251 Draft CR to update RMC and SCell SSB burst position for A.6.5.2.1   <Clauses affected>  A.3.1.1.2, A.6.5.2.1 | | | | | | | | |
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|  | | **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:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

<<Unchanged sections skipped>>

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## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

BWChannel Channel bandwidth, defined in TS 38.101-1, 38.101-2 and 38.101-3 subclause 3.2

Ês Received energy per RE (power normalized to the subcarrier spacing) during the useful part of the symbol, i.e. excluding the cyclic prefix, at the UE antenna connector

FC *RF reference frequency* on the channel raster, given in table 5.4.2.2-1 in TS 38.101-1 and 38.101-2

FC,low The Fc of the lowest carrier, expressed in MHz

Io The total received power density, including signal and interference, as measured at the UE antenna connector.

Ioc The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited noise source (simulating interference from cells, which are not defined in a test procedure) as measured at the UE antenna connector.

Iot The received power spectral density of the total noise and interference for a certain RE (power integrated over the RE and normalized to the subcarrier spacing) as measured at the UE antenna connector

 The power spectral density of a white noise source (average power per RE normalised to the subcarrier spacing), simulating interference from cells that are not defined in a test procedure, as measured at the UE antenna connector

 Physical Resource Block number as defined in clause 3.2 in TS 38.211.

 Timing offset between uplink and downlink radio frames at the UE, as defined in clause 4.2 in TS 38.213.

 Fixed timing advance offset, as defined in clause 7.1.2.2 in TS 38.133.

 Configured UE transmitted power as defined in clause 6.2.4 in TS 38.101-1, 38-101-2 and 38.101-3.

PCMAX,c Configured UE transmitted power on a serving cell *c* as defined in clause 6.2.4 in TS 38.101-1, 38-101-2 and 38.101-3

S Cell Selection Criterion defined in TS 38.304, subclause 5.2.3.2 for NR

SSB\_RP Received (linear) average power of the resource elements that carry NR synchronisation burst, measured at the UE antenna connector

Srxlev Cell selection RX level, defined in TS 38.304, subclause 5.2.3.2

Squal Cell selection quality, defined in TS 38.304, subclause 5.2.3.2

Sintrasearch Defined in TS 38.304 , subclause 5.2.4.7 for E-UTRAN amd 38.304 subclause 5.2.4.7 for NR

Snonintrasearch Defined in TS 38.304 , subclause 5.2.4.7

Tc Basic time unit, defined in clause 4.1 of TS 38.211 [6].

Treselection Defined in TS 25.304, subclause 5.2.6.1.5

TreselectionRAT Defined in TS 36.304 , subclause 5.2.4.7

TreselectionEUTRA Defined in TS 36.304 , subclause 5.2.4.7

TreselectionUTRA Defined in TS 36.304 , subclause 5.2.4.7

TreselectionGERANDefined in TS 36.304 , subclause 5.2.4.

Threshx, high Defined in TS 38.304 , subclause 5.2.4.7

Threshx, low  Defined in TS 38.304 , subclause 5.2.4.7

Threshserving, low Defined in TS 38.304 , subclause 5.2.4.7

Ts Reference time unit, defined in clause 4.1 of TS 38.211 [6].

TUE\_re-establish\_delay Time between the moments when any of the conditions requiring RRC re-establishment as defined in clause 5.3.7 in TS 38.331 [2] is detected by the UE and when the UE sends PRACH to the target PCell.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

## A.3.1 Reference measurement channels

### A.3.1.1 PDSCH

#### A.3.1.1.1 FDD

Table A.3.1.1.1-1: PDSCH Reference Measurement Channels for SCS=15kHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | SR.1.1 FDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | Defined in test case |  |  |  |  |  |  |
| Number of transmitter antennas |  | 1 |  |  |  |  |  |  |
| Allocated resource blocks for PDSCH Note 1 |  | 24 |  |  |  |  |  |  |
| Allocated slots per Radio Frame |  | 10 |  |  |  |  |  |  |
| Radio frame containing SSB | slots | Note 5 |  |  |  |  |  |  |
| Radio frame not containing SSB | slots | 10 |  |  |  |  |  |  |
| 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 SMTC duration 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.3.10. | | | | | | | | |

#### A.3.1.1.2 TDD

Table A.3.1.1.2-1: PDSCH Reference Measurement Channels for SCS=15kHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | SR.1.1 TDD | SR.1.2 TDD |  |  |  |  |  |
| Channel bandwidth | MHz | Defined in test case | Defined in test case |  |  |  |  |  |
| Number of transmitter antennas |  | 1 | 1 |  |  |  |  |  |
| Allocated resource blocks for PDSCH Note 1 |  | 24 | 24 |  |  |  |  |  |
| Allocated slots per Radio Frame |  |  |  |  |  |  |  |  |
| Radio frame containing SSB | slots | Note 5 | Note 5 |  |  |  |  |  |
| Radio frame not containing SSB | slots | 4 | 6 |  |  |  |  |  |
| MCS table |  | 64QAM | 64QAM |  |  |  |  |  |
| MCS index |  | 4 | 4 |  |  |  |  |  |
| Modulation |  | QPSK | QPSK |  |  |  |  |  |
| Target Coding Rate |  | 1/3 | 1/3 |  |  |  |  |  |
| Number of control symbols |  | 2 | 2 |  |  |  |  |  |
| PDSCH mapping type |  | Type A | Type A |  |  |  |  |  |
| Information Bit Payload |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2 | bits | 1608 | 1608 |  |  |  |  |  |
| For slots without RMSI | bits | 1864 | 1864 |  |  |  |  |  |
| For special slots | bits | N/A | 1128 |  |  |  |  |  |
| Number of Code Blocks per slot |  | 1 | 1 |  |  |  |  |  |
| Binary Channel Bits Per slot |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 2, Note 4 | bits | 5184 | 5184 |  |  |  |  |  |
| For slots without RMSI Note 6 | bits | 6048 | 6048 |  |  |  |  |  |
| For special slots Note 6 | Bits | - | 3744 |  |  |  |  |  |
| Note 1: Allocated outside the SMTC duration 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.3.10.  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. | | | | | | | | |

Table A.3.1.1.2-2: PDSCH Reference Measurement Channels for SCS=30kHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | SR.2.1 TDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | Defined in test case |  |  |  |  |  |  |
| 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 | 10 |  |  |  |  |  |  |
| 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 | 6048 |  |  |  |  |  |  |
| Note 1: Allocated outside the SMTC duration 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.3.10.  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. | | | | | | | | |

Table A.3.1.1.2-3: PDSCH Reference Measurement Channels for SCS=120kHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | SR.3.1 TDD | SR.3.2 TDD | SR.3.3 TDD |  |  |  |  |
| Channel bandwidth | MHz | 100 | 100 | 100 |  |  |  |  |
| Number of transmitter antennas |  | 1 | 1 | 1 |  |  |  |  |
| Allocated resource blocks for PDSCH |  | 24 Note 1 | 24Note 7 | 48Note 7 |  |  |  |  |
| Allocated slots per Radio Frame |  |  |  |  |  |  |  |  |
| Radio frame containing SSB | slots | Note 5 | Note 5 | Note 5 |  |  |  |  |
| Radio frame not containing SSB | slots | 48 | 48 | 48 |  |  |  |  |
| MCS table |  | 64QAM | 64QAM | 64QAM |  |  |  |  |
| MCS index |  | 4 | 4 | 4 |  |  |  |  |
| Modulation |  | QPSK | QPSK | QPSK |  |  |  |  |
| Target Coding Rate |  | 1/3 | 1/3 | 1/3 |  |  |  |  |
| Number of control symbols |  | 2 | 2 | 2 |  |  |  |  |
| PDSCH mapping type |  | Type A | Type A | Type A |  |  |  |  |
| Information Bit Payload |  |  |  |  |  |  |  |  |
| For slots with RMSI | bits | 1608 | 1608 | 3104 |  |  |  |  |
| For slots without RMSI | bits | 1864 | 1864 | 3624 |  |  |  |  |
| Number of Code Blocks per slot |  | 1 | 1 | 1 |  |  |  |  |
| Binary Channel Bits Per slot |  |  |  |  |  |  |  |  |
| For slots with RMSI Note 4 | bits | 5184 | 5184 | 10368 |  |  |  |  |
| For slots without RMSI Note 6 | bits | 6048 | 6048 | 12096 |  |  |  |  |
| Note 1: Allocated in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block  Note 2: Void  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-AdditionalPositions=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.3.10.  Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditionalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.  Note 7: Allocated in the same resource blocks as the CORESET.  Note 8: When DRX is configured, PDSCH is scheduled only while *drx-onDurationTimer* is running, unless otherwise specified in the test case. | | | | | | | | |

### A.3.1.2 CORESET for RMSI scheduling

#### A.3.1.2.1 FDD

Table A.3.1.2.1-1: RMSI CORESET Reference Channel for FDD with SCS=15KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CR.1.1 FDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | Defined in test case |  |  |  |  |  |  |
| Subcarrier spacing for RMSI CORESET | kHz | 15 |  |  |  |  |  |  |
| Allocated resource blocks for RMSI CORESET Note 7 |  | 24 |  |  |  |  |  |  |
| Subcarrier spacing for SSB | kHz | 15 |  |  |  |  |  |  |
| SSB and RMSI CORESET multiplexing configuration Note 7 |  | Pattern 1 |  |  |  |  |  |  |
| Offset between SSB and RMSI CORESET Note 3, 7 | RB | 0 (Note8) |  |  |  |  |  |  |
| Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4 |  | Index 4 |  |  |  |  |  |  |
| 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 0 in Table 13-1 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.3.1.2.2 TDD

Table A.3.1.2.2-1: RMSI CORESET Reference Channel for TDD with SCS=15KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CR.1.1 TDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | Defined in test case |  |  |  |  |  |  |
| Subcarrier spacing | kHz | 15 |  |  |  |  |  |  |
| Allocated resource blocks for RMSI CORESET Note 7 |  | 24 |  |  |  |  |  |  |
| 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 4 |  |  |  |  |  |  |
| 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 0 in Table 13-1 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. | | | | | | | | |

Table A.3.1.2.2-2: RMSI CORESET Reference Channel for TDD with SCS=30KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CR.2.1 TDD |  |  |  |  |  |  |
| Channel bandwidth | MHz | Defined in test case |  |  |  |  |  |  |
| Subcarrier spacing | kHz | 30 |  |  |  |  |  |  |
| Allocated resource blocks for RMSI CORESET Note 7 |  | 24 |  |  |  |  |  |  |
| 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 4 |  |  |  |  |  |  |
| 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 0 in Table 13-6 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. | | | | | | | | |

Table A.3.1.2.2-3: RMSI CORESET Reference Channel for TDD with SCS=120KHz

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | |
| Reference channel |  | CR.3.1 TDD | CR.3.2 TDD |  |  |  |  |  |
| Channel bandwidth | MHz | 100 | 100 |  |  |  |  |  |
| Subcarrier spacing | kHz | 120 | 120 |  |  |  |  |  |
| Allocated resource blocks for RMSI CORESET |  | 24 Note 7 | 48 Note 9 |  |  |  |  |  |
| SSB and RMSI CORESET multiplexing configuration |  | Pattern 1 Note 7 | Pattern 1 Note 9 |  |  |  |  |  |
| Offset between SSB and RMSI CORESET Note 3 | RB | 0 (Note 8) Note 7 | 0 (Note 8) Note 9 |  |  |  |  |  |
| Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4 |  | Index 4 | Index 4 |  |  |  |  |  |
| Number of transmitter antennas |  | 1 | 1 |  |  |  |  |  |
| Duration of RMSI CORESET | symbols | 2 Note 7 | 2 Note 9 |  |  |  |  |  |
| DCI Format Note 1 |  | Note 2 | Note 2 |  |  |  |  |  |
| Aggregation level | CCE | 8 | 8 |  |  |  |  |  |
| DMRS precoder granularity |  | 6 | 6 |  |  |  |  |  |
| REG bundle size |  | 6 | 6 |  |  |  |  |  |
| Mapping from REG to CCE |  | Distributed | Distributed |  |  |  |  |  |
| Cell ID |  | Note 5 | Note 5 |  |  |  |  |  |
| Payload (without CRC) | bits | Note 6 | 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 13-12 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 0 in Table 13-8 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.  Note 9: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 2 in Table 13-10 in TS 38.213 [3]. | | | | | | | | |

### A.3.1.3 CORESET for RMC scheduling

#### A.3.1.3.1 FDD

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

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

#### A.3.1.3.2 TDD

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

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

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

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

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

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

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

#### A.3.2.1.1 OCNG pattern 1: Generic OCNG pattern for all unused REs

**Table A.3.2.1.1-1: OP.1: Generic OCNG pattern for all unused REs**

|  |  |  |
| --- | --- | --- |
| OCNG Parameters | Control Region | Data Region |
| Resource allocation | Unused REs (Note 1) | Unused REs (Note 2) |
| Channel | PDCCH | PDSCH |
| Contents | Virtual UE IDs | Uncorrelated pseudo random QPSK modulated data |
| Antenna transmission scheme | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Subcarrier spacing | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Aggregation level | Same as used in PDCCH RMC | N/A |
| Code rate | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Transmit Power | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| CP length | Same as used in PDCCH RMC | Same as used in PDSCH RMC |
| Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test.  Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell, confined to BWoccupied where specified in the test case. | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.3.9.2 Downlink BWP configurations

#### A.3.9.2.1 Initial BWP

**Table A.3.9.2.1-1: Downlink BWP patterns for initial BWP configuration**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| BWP Parameters | Unit | Values | | |
| Reference BWP |  | DLBWP.0.1 | DLBWP.0.2 |  |
| Starting PRB index |  | 0 | RBc Note 1 |  |
| Bandwidth | RB | Same as RF channel defined in each test | same as RMSI CORESET (CORESET #0) defined in each test |  |
| Note 1: RBc is the lowest PRB index to guarantee the BWP including CORESET #0 which is defined in Clause A.3.1.2. | | | | |

#### A.3.9.2.2 Dedicated BWP

**Table A.3.9.2.2-1: Downlink BWP patterns for dedicated BWP configuration**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| BWP Parameters | Unit | Values | | |
| Reference BWP |  | DLBWP.1.1 | DLBWP.1.2 | DLBWP.1.3 |
| Starting PRB index |  | 0 | RBb Note 1 | RBa Note 2 |
| Bandwidth | RB | Same as RF channel defined in each test | 25 for SSB SCS = 15KHz,  51 for SSB SCS = 30KHz,  32 for SSB SCS = 120KHz  48 for SSB SCS = 240KHz | 25 for SSB SCS = 15KHz,  51 for SSB SCS = 30KHz,  32 for SSB SCS = 120KHz  48 for SSB SCS = 240KHz |
| Note 1: RBb is the lowest PRB index to guarantee the BWP not fully overlapped with SSB PRB index (RBJ, RBJ+1,.…, RBJ+19) which is defined in Clause A.3.10.  Note 2: RBa is the lowest PRB index to guarantee the BWP including SSB PRB index (RBJ, RBJ+1,.…, RBJ+19) which is defined in Clause A.3.10. | | | | |

### A.3.9.3 Uplink BWP configurations

#### A.3.9.3.1 Initial BWP

**Table A.3.9.3.1-1: Uplink BWP patterns for initial BWP configuration**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| BWP Parameters | Unit | Values | | |
| Reference BWP |  | ULBWP.0.1 | ULBWP.0.2 |  |
| Starting PRB index |  | 0 | RBc Note 1 |  |
| Bandwidth | RB | Same as RF channel defined in each test | same as RMSI CORESET (CORESET #0) defined in each test |  |
| Note 1: RBc is same as RBc for DLBWP.0.2 as defined in Table A.3.9.2.1-1. | | | | |

#### A.3.9.3.2 Dedicated BWP

**Table A.3.9.3.2-1: Uplink BWP patterns for dedicated BWP configuration**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| BWP Parameters | Unit | Values | | |
| Reference BWP |  | ULBWP.1.1 | ULBWP.1.2 | ULBWP.1.3 |
| Starting PRB index |  | 0 | RBb Note 1 | RBa Note 2 |
| Bandwidth | RB | Same as RF channel defined in each test | 25 for SSB SCS = 15KHz,  51 for SSB SCS = 30KHz,  32 for SSB SCS = 120KHz  48 for SSB SCS = 240KHz | 25 for SSB SCS = 15KHz,  51 for SSB SCS = 30KHz,  32 for SSB SCS = 120KHz  48 for SSB SCS = 240KHz |
| Note 1: RBb is same as RBb for DLBWP.1.2 as defined in Table A.3.9.2.2-1.  Note 2: RBa is same as RBa for DLBWP.1.3 as defined in Table A.3.9.2.2-1. | | | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

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

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

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

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.3.1-2 and A.4.5.2.3.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL

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

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

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

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is E-UTRAN RF channel and the other two are NR RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Active PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on NR RF channel number 3. |
| CP length |  | Normal | Applicable to Cell1, Cell2 and Cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell2** | **Cell3** |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1,4 |  | FDD | FDD |
| Config 2,3,5,6 | TDD | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable | Not Applicable |
| Config 2,5 | TDDConf.1.1 | TDDConf.1.1 |
| Config 3,6 | TDDConf.2.1 | TDDConf.2.1 |
| BWchannel | Config 1,4 |  | Note 8 | Note 8 |
| Config 2,5 | Note 8 | Note 8 |
| Config 3,6 | Note 8 | Note 8 |
| BWoccupied | Config 1,4 | RB | 52 Note 6 | 52 Note 6 |
| Config 2,5 | 52 Note 6 | 52 Note 6 |
| Config 3,6 | 106 Note 7 | 106 Note 7 |
| Initial DL BWP Configuration | Config 1,4 |  | DLBWP.0.1 | DLBWP.0.1 |
| Config 2,5 | DLBWP.0.1 | DLBWP.0.1 |
| Config 3,6 | DLBWP.0.1 | DLBWP.0.1 |
| Dedicated DL BWP Configuration | Config 1,4 |  | DLBWP.1.1 | DLBWP.1.1 |
| Config 2,5 | DLBWP.1.1 | DLBWP.1.1 |
| Config 3,6 | DLBWP.1.1 | DLBWP.1.1 |
| Initial UL BWP Configuration | Config 1,4 |  | ULBWP.0.1 | ULBWP.0.1 |
| Config 2,5 | ULBWP.0.1 | ULBWP.0.1 |
| Config 3,6 | ULBWP.0.1 | ULBWP.0.1 |
| Dedicated UL BWP Configuration | Config 1,4 |  | ULBWP.1.1 | ULBWP.1.1 |
| Config 2,5 | ULBWP.1.1 | ULBWP.1.1 |
| Config 3,6 | ULBWP.1.1 | ULBWP.1.1 |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | - |
| Config 2,5 | SR.1.1 TDD | - |
| Config 3,6 | SR.2.1 TDD | - |
| RMSI CORESET parameters | Config 1,4 |  | CR.1.1 FDD | CR.1.1 FDD |
| Config 2,5 | CR.1.1 TDD | CR.1.1 TDD |
| Config 3,6 | CR.2.1 TDD | CR.2.1 TDD |
| PDCCH CORESET parameters | Config 1,4 |  | CCR.1.1 FDD | CCR.1.1 FDD |
| Config 2,5 | CCR.1.1 TDD | CCR.1.1 TDD |
| Config 3,6 | CCR.2.1 TDD | CCR.2.1 TDD |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD | TRS.1.1 FDD |
| Config 2,5 | TRS.1.1 TDD | TRS.1.1 TDD |
| Config 3,6 | TRS.1.2 TDD | TRS.1.2 TDD |
| OCNG Patterns | Config 1,2,4,5 |  | OP.1 Note 6 | OP.1 Note 6 |
| Config 3,6 |  | OP.1 Note 7 | OP.1 Note 7 |
| SMTC Configuration | |  | SMTC.1 | SMTC.1 |
| TCI state | |  | TCI.State.0 | TCI.State.0 |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 | SSB.1 FR1 |
| Config 3,6 | SSB.2 FR1 | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low |
| EPRE ratio of PSS to SSS | | 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 | | dBm/15 kHz | -104 | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | -87 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/  9.36MHz | -58.96 | -58.96 |
| Config 3,6 | dBm/  38.16MHz | -52.86 | -52.86 |
| Time offset to Cell1 Note 4 | | μs | 33 | 33 + Time offset to Cell2 |
| Time offset to Cell2 Note 5 | | μs | - | 3 |
| Propagation Condition | |  | AWGN | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled within BWoccupied.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 8: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | |

##### A.4.5.2.3.2 Test Requirements

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

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

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

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

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

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

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

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

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

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

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

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

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

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.4.1-2 and A.4.5.2.4.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

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

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

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

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is E-UTRAN RF channel and the other two are NR RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on NR RF channel number 3. |
| CP length |  | Normal | Applicable to Cell1, Cell2 and Cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | Cell3 |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1,4 |  | FDD | FDD |
| Config 2,3,5,6 | TDD | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable | Not Applicable |
| Config 2,5 | TDDConf.1.1 | TDDConf.1.1 |
| Config 3,6 | TDDConf.2.1 | TDDConf.2.1 |
| BWchannel | Config 1,4 |  | Note 8 | Note 8 |
| Config 2,5 | Note 8 | Note 8 |
| Config 3,6 | Note 8 | Note 8 |
| BWoccupied | Config 1,4 | RB | 52 Note 6 | 52 Note 6 |
| Config 2,5 | 52 Note 6 | 52 Note 6 |
| Config 3,6 | 106 Note 7 | 106 Note 7 |
| Initial BWP Configuration | Config 1,4 |  | DLBWP.0.1 | DLBWP.0.1 |
| Config 2,5 | DLBWP.0.1 | DLBWP.0.1 |
| Config 3,6 | DLBWP.0.1 | DLBWP.0.1 |
| Dedicated DL BWP Configuration | Config 1,4 |  | DLBWP.1.1 | DLBWP.1.1 |
| Config 2,5 | DLBWP.1.1 | DLBWP.1.1 |
| Config 3,6 | DLBWP.1.1 | DLBWP.1.1 |
| Initial UL BWP Configuration | Config 1,4 |  | ULBWP.0.1 | ULBWP.0.1 |
| Config 2,5 | ULBWP.0.1 | ULBWP.0.1 |
| Config 3,6 | ULBWP.0.1 | ULBWP.0.1 |
| Dedicated UL BWP Configuration | Config 1,4 |  | ULBWP.1.1 | ULBWP.1.1 |
| Config 2,5 | ULBWP.1.1 | ULBWP.1.1 |
| Config 3,6 | ULBWP.1.1 | ULBWP.1.1 |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | - |
| Config 2,5 | SR.1.1 TDD | - |
| Config 3,6 | SR.2.1 TDD | - |
| RMSI CORESET parameters | Config 1,4 |  | CR.1.1 FDD | CR.1.1 FDD |
| Config 2,5 | CR.1.1 TDD | CR.1.1 TDD |
| Config 3,6 | CR.2.1 TDD | CR.2.1 TDD |
| PDCCH CORESET parameters | Config 1,4 |  | CCR.1.1 FDD | CCR.1.1 FDD |
| Config 2,5 | CCR.1.1 TDD | CCR.1.1 TDD |
| Config 3,6 | CCR.2.1 TDD | CCR.2.1 TDD |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD | TRS.1.1 FDD |
| Config 2,5 | TRS.1.1 TDD | TRS.1.1 TDD |
| Config 3,6 | TRS.1.2 TDD | TRS.1.2 TDD |
| OCNG Patterns | Config 1,2,4,5 |  | OP.1 Note 6 | OP.1 Note 6 |
| Config 3,6 |  | OP.1 Note 7 | OP.1 Note 7 |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 | SSB.1 FR1 |
| Config 3,6 | SSB.2 FR1 | SSB.2 FR1 |
| SMTC Configuration |  |  | SMTC.1 | SMTC.1 |
| TCI state | |  | TCI.State.0 | TCI.State.0 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 1x2 Low |
| EPRE ratio of PSS to SSS | | 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 | | dBm/15 kHz | -104 | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | -87 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/  9.36MHz | -58.96 | -58.96 |
| Config 3,6 | dBm/  38.16MHz | -52.86 | -52.86 |
| Time offset to Cell1 Note 4 | | ms | 3 | 3 + Time offset to Cell2 |
| Time offset to Cell2 Note 5 | | μs | - | 3 |
| Propagation Condition | |  | AWGN | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled within BWoccupied.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 8: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | |

##### A.4.5.2.4.2 Test Requirements

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

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

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

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

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

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

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

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

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

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

A.4.5.3 SCell Activation and Deactivation Delay

#### A.4.5.3.1 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

##### A.4.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.4.5.3.1.1-1 below. The test parameters are given in Tables A.4.5.3.1.1-2 and cell-specific parameters in A.4.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

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

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

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3. The starting point of any E-UTRA PCell interruption due to the deactivation shall occur in the subframe to subframe , where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

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.

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

Table A.4.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

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

Table A.4.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2,3 | One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.1 |
| Active PSCell |  | Cell 2 | Primary secondary cell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every four slots |
| Cell-individual offset for cells on E-UTRA RF channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on secondary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell3 timing offset to cell2 | μs | 0 |  |
| Time alignment error between cell3 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| TCSI\_Reporting | ms |  | The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing timefor CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]  is the subcarrier spacing configuration for DL |
| k | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

Table A. 4.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN | |  | freq1 | | | freq2 | | |
| Duplex mode | Config 1,4 |  | FDD | | | | | |
| Config 2,3,5,6 | TDD | | | | | |
| TDD configuration | Config 1,4 |  | Not Applicable | | | | | |
| Config 2,5 | TDDConf.1.1 | | | | | |
| Config 3,6 | TDDConf.2.1 | | | | | |
| BWchannel | Config 1,4 | MHz | Note 7 | | | | | |
| Config 2,5 | Note 7 | | | | | |
| Config 3,6 | Note 7 | | | | | |
| BWoccupied | Config 1,4 | RB | 52 Note 5 | | | | | |
| Config 2,5 | 52 Note 5 | | | | | |
| Config 3,6 | 106 Note 6 | | | | | |
| DL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.0.1 | | | | | |
| DL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | DLBWP.1.1 | | | | | |
| UL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.0.1 | | | | | |
| UL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 |  | ULBWP.1.1 | | | | | |
| DRx Cycle | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | | | SR.1.1 FDD | | |
| Config 2,5 | SR.1.1 TDD | | | SR.1.1 TDD | | |
| Config 3,6 | SR.2.1 TDD | | | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel | Config 1,4 |  | CR.1.1 FDD | | | CR.1.1 FDD | | |
| Config 2,5 | CR.1.1 TDD | | | CR.1.1 TDD | | |
| Config 3,6 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| RMC CORESET Reference Channel | Config 1,4 |  | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| Config 2,5 |  | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
| Config 3,6 |  | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD | | | TRS.1.1 FDD | | |
| Config 2,5 |  | TRS.1.1 TDD | | | TRS.1.1 TDD | | |
| Config 3,6 |  | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| OCNG Patterns | Config 1,2,4,5 |  | OP.1 Note 5 | | | | | |
| Config 3,6 |  | OP.1 Note 6 | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | | | | |
| Config 3,6 | SSB.2 FR1 | | | | | |
| CSI-RS configuration for CSI reporting | Config 1,4 |  | CSI-RS.1.1 FDD | | | | | |
| Config 2,5 |  | CSI-RS.1.1 TDD | | | | | |
| Config 3,6 |  | CSI-RS.2.1 TDD | | | | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | kHz | 15 kHz | | | | | |
| Config 3,6 | 30kHz | | | | | |
| CSI reporting periodicity | Config 1-6 | ms | 5 | | | | | |
| 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 | -104 | | | | | |
| Note2 | Config 1,2,4,5 | dBm/SCS | -104 | | | | | |
| Config 3,6 | -101 | | | | | |
|  | | dB | 17 | | | | | |
|  | | dB | 17 | | | | | |
| SS-RSRPNote3 | Config 1,2,4,5 | dBm/SCS | -87 | | | | | |
| Config 3,6 | -84 | | | | | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | | | | | |
| IoNote3 | Config 1,2,4,5 | dBm/  9.36MHz | -58.96 | | | | | |
| Config 3,6 | dBm/  38.16MHz | -52.87 | | | | | |
| Propagation condition | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled within BWoccupied.  Note 3: SS-RSRP, Io and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]  Note 5: All UL/DL transmission shall be confined within BWchannel\_actual-occupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWchannel\_actual-occupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | | | | | |

##### A.4.5.3.1.2 Test Requirements

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

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

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

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

During T3 the starting point of interruption of PSCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3 and the starting point of interruption of E-UTRA PCell during SCell deactivation shall not happen outside the subframe to subframe .

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

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

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

#### A.4.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 320 ms SCell measurement cycle

##### A.4.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1. The supported test configurations are the same as defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2.

Table A.4.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320 ms SCell measurement cycle

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

##### A.4.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstSSB\_MAX + Trs + 5ms.

<<End of change>>

<<Unchanged sections skipped>>

<< Start of change >>

#### A.4.5.3.3 SCell Activation and deactivation of unknown SCell in FR1

##### A.4.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in slot as defined in clause 8.3 provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI in slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot to slot, as defined in clause 8.3, where is the interruption length given in section 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe to subframe, where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and is the interruption length given in TS 36.133 [14] section 7.32.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in slot as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3. The starting point of any E-UTRA PCell interruption due to the deactivation shall occur in the subframe to subframe , where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

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

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

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.4.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| T1 | ms | 100 | During this time the PSCell shall be known and the SCell configured, but not detected. |

<<End of change>>

<< Unchanged sections skipped >>

<<Start of change>>

### A.4.5.4 UE UL carrier RRC reconfiguration Delay

#### A.4.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.4.5.4.1-1 - Table A.4.5.4.1-4 : Void

##### A.4.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are three cells: E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and FR1 SCell (Cell 3). For SCell, both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB.* The test parameters for PSCell and SCell are given in Table A. 4.5.4.1.1-1, Table A. 4.5.4.1.1-2, Table A. 4.5.4.1.1-3 and Table A. 4.5.4.1.1-4 below. The test parameters and applicability for E-UTRAN PCell are defined in A.3.7.2. The test consists two tests. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 3 is configured to UE*.* At the start of T2, a supplementary uplink of cell3 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 3 is configured to UE*.* At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.4.5.4.1.1-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | PSCell (Cell2) | SCell (Cell3) |
| 1 | 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode | DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode;  SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 2 | 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode | DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode;  SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 3 | 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode | DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode;  SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode |
| 4 | 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode | DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode;  SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 5 | 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode | DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode;  SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 6 | 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode | DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode;  SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode |
| 7 | 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode | DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode;  SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode |
| 8 | 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode | DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode;  SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 9 | 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode | DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode;  SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration, | | |

Table A.4.5.4.1.1-2: General test parameters for EN-DC UE UL carrier RRC reconfiguration Delay

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| RF Channel Number |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 1, 2, 3 | Three radio channels are used for these two tests. |
| Active cell |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | Cell 1: E-UTRAN PCell  Cell 2: FR1 PSCell  Cell 3: FR1 SCell | E-UTRAN PCell on RF channel number 1  FR1 PSCell on RF channel number 2  FR1 SCell on RF channel number 3 |
| CP length |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | Normal |  |
| DRX |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | OFF |  |
| Measurement gap pattern Id |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | OFF |  |
| Filter coefficient |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 0 | L3 filtering is not used |
| T1 | s | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 5 |  |
| T2 | s | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 5 |  |
| T3 | s | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 5 |  |

Table A.4.5.4.1.1-3: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on PSCell (Cell 2)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test Configuration | Test 1 | | | Test 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| Channel number |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 2 | | | 2 | | |
| TDD configuration |  | Conf 1, 2, 3 | N/A | | | N/A | | |
| Conf 4, 5, 6 | TDD Conf.1.1 | | | TDD Conf.1.1 | | |
| Conf 7, 8, 9 | TDD Conf.2.1 | | | TDD Conf.2.1 | | |
| BWchannel | MHz | Conf 1, 2, 3 | Note 6 | | | Note 6 | | |
| Conf 4, 5, 6 | Note 6 | | | Note 6 | | |
| Conf 7, 8, 9 | Note 6 | | | Note 6 | | |
| BWoccupied | RB | Conf 1, 2, 3 | 52 Note 4 | | | 52 Note 4 | | |
| Conf 4, 5, 6 | 52 Note 4 | | | 52 Note 4 | | |
| Conf 7, 8, 9 | 106 Note 5 | | | 106 Note 5 | | |
| PDSCH reference measurement channel as defined in A.3.1.1 |  | Conf 1, 2, 3 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| Conf 4, 5, 6 | SR.1.1 TDD | | | SR.1.1 TDD | | |
| Conf 7, 8, 9 | SR 2.1 TDD | | | SR 2.1 TDD | | |
| RMSI CORESET reference measurement channel as defined in A.3.1.2 |  | Conf 1, 2, 3 | CR.1.1 FDD | | | CR.1.1 FDD | | |
| Conf 4, 5, 6 | CR.1.1 TDD | | | CR.1.1 TDD | | |
| Conf 7, 8, 9 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| RMC CORESET reference measurement channel as defined in A.3.1.3 |  | Conf 1, 2, 3 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| Conf 4, 5, 6 | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
| Conf 7, 8, 9 | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| OCNG Pattern Note 1 |  | Conf 1, 2, 3, 4, 5, 6 | OP.1 Note 4 | | | OP.1 Note 4 | | |
|  | Config 7, 8, 9 | OP.1 Note 5 | | | OP.1 Note 5 | | |
| SSB configuration |  | Conf 1, 2, 3, 4, 5, 6 | SSB.1 FR1 | | | SSB.1 FR1 | | |
| Conf 7, 8, 9 | SSB.2 FR1 | | | SSB.2 FR1 | | |
| SMTC configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | SMTC.1 | | | SMTC.1 | | |
| CSI-RS for tracking |  | Conf 1 | TRS.1.1 FDD | | | TRS.1.1 FDD | | |
|  | Conf 2 | TRS.1.1 FDD | | | TRS.1.1 FDD | | |
|  | Conf 3 | TRS.1.1 FDD | | | TRS.1.1 FDD | | |
|  | Conf 4 | TRS.1.1 TDD | | | TRS.1.1 TDD | | |
|  | Conf 5 | TRS.1.1 TDD | | | TRS.1.1 TDD | | |
|  | Conf 6 | TRS.1.1 TDD | | | TRS.1.1 TDD | | |
|  | Conf 7 | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
|  | Conf 8 | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
|  | Conf 9 | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| DL initial BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| DL dedicated BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | DLBWP.1.1 | | | DLBWP.1.1 | | |
| UL dedicated BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | ULBWP.1.1 | | | ULBWP.1.1 | | |
| EPRE ratio of PSS to SSS | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 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 SSS |
| EPRE ratio of OCNG to OCNG DMRS |
| Note 2 | dBm / 15kHz | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | -102 | | | -102 | | |
| dBm/ SCS | Conf 1,2,3,4,5,6 | -102 | | | -102 | | |
| Conf 7,8,9 | -99 | | | -99 | | |
|  | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 16 | 16 | 16 | 16 | 16 | 16 |
| Note 3 | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 16 | 16 | 16 | 16 | 16 | 16 |
| SS-RSRP Note 3 | dBm/ SCS | Conf 1,2,3,4,5,6 | -86 | -86 | -86 | -86 | -86 | -86 |
| Conf 7,8,9 | -83 | -83 | -83 | -83 | -83 | -83 |
| Io Note 3 | dBm/ 9.36 MHz | Conf 1,2,3,4,5,6 | -57.9 | -57.9 | -57.9 | -57.9 | -57.9 | -57.9 |
| dBm/ 38.16MHz | Conf 7,8,9 | -51.8 | -51.8 | -51.8 | -51.8 | -51.8 | -51.8 |
| Propagation Condition |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | AWGN | | | AWGN | | |
| Antenna configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 1 x 2 | | | 1 x 2 | | |
| NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled within BWoccupied.  NOTE 3: , Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  NOTE 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | | | | | |

Table A.4.5.4.1.1-4: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on SCell (Cell 3)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test Configuration | Test 1 | | | | Test 2 | | |
| T1 | T2 | | T3 | T1 | T2 | T3 |
| Channel number |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 3 | | | | 3 | | |
| TDD configuration |  | Conf 1, 4, 7 | N/A | | | | N/A | | |
| Conf 2, 5, 8 | TDDConf.1.1 | | | | TDDConf.1.1 | | |
| Conf 3, 6, 9 | TDDConf.2.1 | | | | TDDConf.2.1 | | |
| BWchannel | MHz | Conf 1, 4, 7 | Note 6 | | | | Note 6 | | |
| Conf 2, 5, 8 | Note 6 | | | | Note 6 | | |
| Conf 3, 6, 9 | Note 6 | | | | Note 6 | | |
| BWoccupied | RB | Conf 1, 4, 7 | 52 Note 4 | | | | 52 Note 4 | | |
| Conf 2, 5, 8 | 52 Note 4 | | | | 52 Note 4 | | |
| Conf 3, 6, 9 | 106 Note 5 | | | | 106 Note 5 | | |
| PUSCH parameters for NR UL carrier |  | Conf 1, 4, 7 | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | | N/A | G-FR1-A3-10 in [13] | N/A |
| Conf 2, 5, 8 | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | | N/A | G-FR1-A3-10 in [13] | N/A |
| Conf 3, 6, 9 | G-FR1-A3-14 in [13] | G-FR1-A3-14 in [13] | G-FR1-A3-14 in [13] | | N/A | G-FR1-A3-14 in [13] | N/A |
| PUCCH parameters  For NR UL carrier |  | Conf 1, 4, 7 | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | | N/A | N/A | N/A |
| Conf 2, 5, 8 | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | | N/A | N/A | N/A |
| Conf 3, 6, 9 | Table 8.3.3.1.2-2 in [13] | Table 8.3.3.1.2-2 in [13] | Table 8.3.3.1.2-2 in [13] | | N/A | N/A | N/A |
| PUSCH parameters for supplementary UL |  | Conf 1, 4, 7 | N/A | G-FR1-A3-10 in [13] | N/A | | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] |
| Conf 2, 5, 8 | N/A | G-FR1-A3-10 in [13] | N/A | | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] |
| Conf 3, 6, 9 | N/A | G-FR1-A3-14 in [13] | N/A | | G-FR1-A3-14 in [13] | G-FR1-A3-14 in [13] | G-FR1-A3-14 in [13] |
| PUCCH parameters for supplementary UL |  | Conf 1, 4, 7 | N/A | N/A | N/A | | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] |
| Conf 2, 5, 8 | N/A | N/A | N/A | | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] |
| Conf 3, 6, 9 | N/A | N/A | N/A | | Table 8.3.3.1.2-2 in [13] | Table 8.3.3.1.2-2 in [13] | Table 8.3.3.1.2-2 in [13] |
| PDSCH reference measurement channel as defined in A.3.1.1 |  | Conf 1, 4, 7 | SR.1.1 FDD | | | | SR.1.1 FDD | | |
| Conf 2, 5, 8 | SR.1.1 TDD | | | | SR.1.1 TDD | | |
| Conf 3, 6, 9 | SR 2.1 TDD | | | | SR 2.1 TDD | | |
| RMSI CORESET reference measurement channel as defined in A.3.1.2 |  | Conf 1, 4, 7 | CR.1.1 FDD | | | | CR.1.1 FDD | | |
| Conf 2, 5, 8 | CR.1.1 TDD | | | | CR.1.1 TDD | | |
| Conf 3, 6, 9 | CR.2.1 TDD | | | | CR.2.1 TDD | | |
| RMC CORESET reference measurement channel as defined in A.3.1.3 |  | Conf 1, 4, 7 | CCR.1.1 FDD | | | | CCR.1.1 FDD | | |
| Conf 2, 5, 8 | CCR.1.1 TDD | | | | CCR.1.1 TDD | | |
| Conf 3, 6, 9 | CCR.2.1 TDD | | | | CCR.2.1 TDD | | |
| OCNG Pattern Note 1 |  | Conf 1, 2, 4, 5, 7, 8 | OP.1 Note 4 | | | | OP.1 Note 4 | | |
|  | Conf 3, 6, 9 | OP.1 Note 5 | | | | OP.1 Note 5 | | |
| SSB configuration |  | Conf 1, 2, 4, 5, 7,8 | SSB.1 FR1 | | | | SSB.1 FR1 | | |
| Conf 3, 6, 9 | SSB.2 FR1 | | | | SSB.2 FR1 | | |
| SMTC configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | SMTC.1 | | | | SMTC.1 | | |
| CSI-RS for tracking |  | Conf 1 | TRS.1.1 FDD | | | | TRS.1.1 FDD | | |
|  | Conf 2 | TRS.1.1 TDD | | | | TRS.1.1 TDD | | |
|  | Conf 3 | TRS.1.2 TDD | | | | TRS.1.2 TDD | | |
|  | Conf 4 | TRS.1.1 FDD | | | | TRS.1.1 FDD | | |
|  | Conf 5 | TRS.1.1 TDD | | | | TRS.1.1 TDD | | |
|  | Conf 6 | TRS.1.2 TDD | | | | TRS.1.2 TDD | | |
|  | Conf 7 | TRS.1.1 FDD | | | | TRS.1.1 FDD | | |
|  | Conf 8 | TRS.1.1 TDD | | | | TRS.1.1 TDD | | |
|  | Conf 9 | TRS.1.2 TDD | | | | TRS.1.2 TDD | | |
| DL initial BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | DLBWP.0.1 | | | | DLBWP.0.1 | | |
| DL dedicated BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | DLBWP.1.1 | | | | DLBWP.1.1 | | |
| UL dedicated BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | ULBWP.1.1 | | | | ULBWP.1.1 | | |
| EPRE ratio of PSS to SSS | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 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 SSS |
| EPRE ratio of OCNG to OCNG DMRS |
| Note 2 | dBm / 15kHz | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | -102 | | | | -102 | | |
| dBm/ SCS | Conf 1, 2, 4, 5, 7,8 | -102 | | | | -102 | | |
| Conf 3, 6, 9 | -99 | | | | -99 | | |
|  | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 16 | 16 | | 16 | 16 | 16 | 16 |
| Note 3 | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 16 | 16 | | 16 | 16 | 16 | 16 |
| SS-RSRP Note 3 | dBm/ SCS | Conf 1, 2, 4, 5, 7,8 | -86 | -86 | | -86 | -86 | -86 | -86 |
| Conf 3, 6, 9 | -83 | -83 | | -83 | -83 | -83 | -83 |
| Io Note 3 | dBm/ 9.36 MHz | Conf 1, 2, 4, 5, 7,8 | -57.9 | -57.9 | | -57.9 | -57.9 | -57.9 | -57.9 |
| dBm/ 38.16MHz | Conf 3, 6, 9 | -51.8 | -51.8 | | -51.8 | -51.8 | -51.8 | -51.8 |
| Propagation Condition |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | AWGN | | | | AWGN | | |
| Antenna configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 1 x 2 | | | | 1 x 2 | | |
| NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled within BWoccupied.  NOTE 3: , Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  NOTE 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | | | | | | |

##### A.4.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

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

###### A.4.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirements for NR victim cell defined in clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [15]. Supported test configurations are shown in Table A.4.5.6.1.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one PSCell (Cell 2) and one SCell (Cell 3) as given in Table A.4.5.6.1.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell and SCell are specified in Table A.4.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA 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 (E-UTRA 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 on the first DL slot that occurs after the beginning of 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 the first UL slot that occurs after the beginning of slot (*i+TBWPswitchDelay+k1*). The UE shall be continuously scheduled on PSCell’s BWP-2 starting from the first DL slot that occurs after the beginning of slot (*i+TBWPswitchDelay*).

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

E-UTRA 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/NACK 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 E-UTRA PCell and SCell during BWP switch of PSCell, respectively.

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

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

Table A.4.5.6.1.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2, 3 | Two NR radio channels are used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| Active SCell |  | Cell 3 | SCell on RF channel number 3. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| *bwp-InactivityTimer* | ms | 200 |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| Cell3 timing offset to cell2 | μs | 3 | Synchronous cells |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |
| T3 | s | 0.2 |  |

Table A.4.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | **Cell 3** |
| Frequency Range | |  | FR1 | |
| Duplex mode | Config 1,4 |  | FDD | |
| Config 2,3,5,6 | TDD | |
| TDD configuration | Config 1,4 |  | Not Applicable | |
| Config 2,5 | TDDConf.1.1 | |
| Config 3,6 | TDDConf.2.1 | |
| BWchannel | Config 1,4 |  | Note 7 | |
| Config 2,5 | Note 7 | |
| Config 3,6 | Note 7 | |
| BWoccupied | Config 1,4 | RB | 52 Note 5 | |
| Config 2,5 | 52 Note 5 | |
| Config 3,6 | 106 Note 6 | |
| Active BWP ID | |  | 1, 2 | 0 |
| Initial BWP Configuration | Config 1,4 |  | DLBWP.0.2 | DLBWP.0.2 |
| Config 2,5 |
| Config 3,6 |
| Active BWP-0 Configuration | Config 1,4 |  | N.A. | DLBWP.0.2 |
| Config 2,5 |
| Config 3,6 |
| Active BWP-1 Configuration | Config 1,4 |  | DLBWP.1.3 | N.A. |
| Config 2,5 |
| Config 3,6 |
| Active BWP-2 Configuration | Config 1,4 |  | DLBWP.1.1 | N.A. |
| Config 2,5 |
| Config 3,6 |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | |
| Config 2,5 | SR.1.1 TDD | |
| Config 3,6 | SR2.1 TDD | |
| RMSI CORESET parameters | Config 1,4 |  | CR.1.1 FDD | |
| Config 2,5 | CR.1.1 TDD | |
| Config 3,6 | CR2.1 TDD | |
| Dedicated CORESET parameters | Config 1,4 |  | CCR.1.1 FDD | |
| Config 2,5 | CCR.1.1 TDD | |
| Config 3,6 | CCR.2.3 TDD | |
| OCNG Patterns | Config 1,2,4,5 |  | OP.1 Note 5 | |
| Config 3,6 |  | OP.1 Note 6 | |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 | |
| Config 3,6 | SSB.2 FR1 | |
| SMTC Configuration | |  | SMTC.1 | |
| TRS Configuration | Config 1,4 |  | TRS.1.1 FDD | |
| Config 2,5 |  | TRS.1.1 TDD | |
| Config 3,6 |  | TRS.1.2 TDD | |
| Antenna Configuration | |  | 1x2 | |
| Propagation Condition | |  | AWGN | |
| EPRE ratio of PSS to SSS | | 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 | | dBm/15 kHz | -104 | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | -87 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/  9.36MHz | -58.96 | -58.96 |
| Config 3,6 | dBm/  38.16MHz | -52.86 | -52.86 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled within BWoccupied.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].  Note 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | |

###### A.4.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PSCell 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 PSCell 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 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 E-UTRA PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

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

The interruption of E-UTRA 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 E-UTRA PCell and SCell active BWP switch interruption to be counted as correct.

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

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL 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.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

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

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

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

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

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

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

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

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

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

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

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

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

Table A.5.5.2.1.1-5: Void

##### A.5.5.2.1.2 Test Requirements

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Table A.5.5.2.2.1-5: Void

##### A.5.5.2.2.2 Test Requirements

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

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

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

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

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

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

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

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

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

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

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is E-UTRAN RF channel and the other two are NR RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on NR RF channel number 3. |
| CP length |  | Normal | Applicable to cell1, cell 2 and cell3 |
| AoA number |  | 1 | Applicable to cell2 and cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |

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

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

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

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

##### A.5.5.2.3.2 Test Requirements

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | One is E-UTRAN RF channel and the other two are NR RF channel |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on NR RF channel number 2. |
| CP length |  | Normal | Applicable to cell1, cell 2 and cell3 |
| AoA number |  | 1 | Applicable to cell2 and cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

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

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

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

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

##### A.5.5.2.4.2 Test Requirements

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

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

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

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

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

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

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

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

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

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

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

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.5.1-1.

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

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

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

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

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is NR RF channel and two are E-UTRAN RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on E-UTRAN RF channel number 3. |
| CP length |  | Normal | Applicable to cell1, cell 2 and cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

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

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

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

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

##### A.5.5.2.5.2 Test Requirements

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

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

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

Table A.5.5.2.5.2-2: Void

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

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

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

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

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

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

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

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

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

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

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is NR RF channel and two are E-UTRAN RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell3 | Deactivated SCell on E-UTRAN RF channel number 3. |
| CP length |  | Normal | Applicable to cell1, cell 2 and cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| SCell measurement cycle (measCycleSCell) | ms | 640 |  |
| T1 | s | 10 |  |

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

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

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

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

##### A.5.5.2.6.2 Test Requirements

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

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

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

Table A.5.5.2.6.2-2: Void

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

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

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

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

A.5.5.3 SCell Activation and Deactivation Delay

A.5.5.3.1 SCell Activation and deactivation of SCell in FR2 intra-band

A.5.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1 except the SCell is in FR2 intra-band.

The supported test configurations are shown in table A.5.5.3.1.1-1 below. The general and cell specific test parameters are the same except those described in the following clause. The listed parameter values in Tables A.5.5.3.1.1-2 and A.5.5.3.1.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2 and A.4.5.3.1.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.1.1-4 below.

**Table A.5.5.3.1.1-1: Supported test configurations for FR2 SCell activation case with FR2 PSCell**

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

**Table A.5.5.3.1.1-2: General test parameters for FR2 SCell activation case with FR2 PSCell**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.2 |

**Table A.5.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case with FR2 PSCell**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 5** | **Unit** | **Cell 2** | | | **Cell 3** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| SSB ARFCN |  | freq1 | | | freq2 | | |
| Duplex mode |  | TDD | | | TDD | | |
| TDD configuration |  | TDDConf.3.1 | | | TDDConf.3.1 | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 66 | | | 66 | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | | | CR.3.1 TDD | | |
| RMC CORESET Reference Channel |  | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| DL initial BWP configuration |  | DLBWP.0.1 | | | | | |
| DL dedicated BWP configuration |  | DLBWP.1.1 | | | | | |
| UL initial BWP configuration |  | ULBWP.0.1 | | | | | |
| UL dedicated BWP configuration |  | ULBWP.1.1 | | | | | |
| OCNG Patterns |  | OP.1 | | | | | |
| SMTC configuration |  | SMTC.1 | | | | | |
| SSB configuration |  | SSB.1 FR2 | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| TRS configuration |  | TRS.2.1 TDD | | | | | |
| EPRE ratio of PSS to SSS | dB | 0 | | | | | |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: All parameters apply for configuration 1 and 2 | | | | | | | |

**Table A.5.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case with FR2 PSCell**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 6** | **Unit** | **Cell 2** | | | **Cell 3** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration |  | Setup 1 according to A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -104.7 | | | -104.7 | | |
| Note1 | dBm/SCSNote3 | -95.7 | | | -95.7 | | |
|  | dB | 7 | | | 7 | | |
| SSB\_RPNote2 | dBm/SCS Note4 | -88.7 | | | -88.7 | | |
|  | dB | 7 | | | 7 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -58.92 | | | -58.92 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: All parameters apply for configuration 1 and 2  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

A.5.5.3.1.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstSSB + 5ms as defined in clause 8.3.

A.5.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

A.5.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1, except PSCell is in FR2.

The supported test configurations are shown in table A.5.5.3.2.1-1 below. The general test parameters are the same in Tables A.4.5.3.1.1-2. The cell specific test parameters are given in Tables A.5.5.3.2.1-2. In this case, OTA related test parameters are the same as in table A.5.5.3.2.1-3.

**Table A.5.5.3.2.1-1: Supported test configurations for FR1 SCell activation case with PSCell is FR2**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Cell 3 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 | |

**Table A.5.5.3.2.1-2: Cell specific test parameters for FR1 SCell activation case with FR2 PSCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | Cell 2 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN | |  | freq2 | | | freq1 | | |
| Duplex mode | Config 1,4 |  | TDD | | | FDD | | |
| Config 2,3,5,6 | TDD | | | TDD | | |
| TDD configuration | Config 1,4 |  | TDDConf.3.1 | | | Not Applicable | | |
| Config 2,5 | TDDConf.1.1 | | |
| Config 3,6 | TDDConf.2.1 | | |
| BWchannel | Config 1,4 | MHz | 100: NRB,c = 66 | | | 10: NRB,c = 52 | | |
| Config 2,5 | 10: NRB,c = 52 | | |
| Config 3,6 | 40: NRB,c = 106 | | |
| Data RBs allocated | Config 1,4 |  | 66 | | | 52 | | |
| Config 2,5 | 52 | | |
| Config 3,6 | 106 | | |
| DL initial BWP configuration | Config 1,2,3,4,5,6 |  | DLBWP.0.1 | | | | | |
| DL dedicated BWP configuration | Config 1,2,3,4,5,6 |  | DLBWP.1.1 | | | | | |
| UL initial BWP configuration | Config 1,2,3,4,5,6 |  | ULBWP.0.1 | | | | | |
| UL dedicated BWP configuration | Config 1,2,3,4,5,6 |  | ULBWP.1.1 | | | | | |
| DRx Cycle | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.3.1 TDD | | | SR.1.1 FDD | | |
| Config 2,5 | SR.1.1 TDD | | |
| Config 3,6 | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel | Config 1,4 |  | CR.3.1 TDD | | | CR.1.1 FDD | | |
| Config 2,5 | CR.1.1 TDD | | |
| Config 3,6 | CR.2.1 TDD | | |
| RMC CORESET Reference Channel | Config 1,4 |  | CCR.3.1 TDD | | | CCR.1.1 FDD | | |
| Config 2,5 |  | CCR.1.1 TDD | | |
| Config 3,6 |  | CCR.2.1 TDD | | |
| OCNG Patterns | |  | OP.1 | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| TCI state | |  | TCI.State.0 | | | NA | | |
| TRS configuration | Config 1,4 |  | TRS.2.1 TDD | | | TRS.1.1 FDD | | |
| Config 2,5 | TRS.1.1 TDD | | |
| Config 3,6 | TRS.1.2 TDD | | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR2 | | | SSB.1 FR1 | | |
| Config 3,6 | SSB.2 FR1 | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | kHz | 120kHz | | | 15kHz | | |
| Config 3,6 | 30kHz | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Propagation condition | | - | AWGN | | | NA  Link only, see clause A.3.7A | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.] | | | | | | | | |

**Table A.5.5.3.2.1-3: OTA related test parameters for FR1 SCell activation case with FR2 PSCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | | | **Cell 3** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration | |  | Setup 1 according to clause A.3.15.1 | | | NA  Link only, see clause A.3.7A | | |
| Assumption for UE beamsNote 7 | |  | Rough | | |
| Note1 | | dBm/15kHz | -104.7 | | |
| Note1 | Config 1,2,4,5 | dBm/SCS | -95.7 | | |
| Config 3,6 |
| SSB\_RPNote2 | Config 1,2,4,5 | dBm/SCS Note3 | -88.7 | | |
| Config 3,6 |
|  | Config 1,2,3,4,5,6 | dB | 7 | | |
|  | | dB | 7 | | |
| IoNote2 | Config 1,2,4,5 | dBm/ChBwNote4,Note6 | -58.92 | | |
| Config 3,6 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: ChBW is 95.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

A.5.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case.

A.5.5.3.3 Void

A.5.5.3.4 Void

A.5.5.3.5 SCell Activation and deactivation of SCell in FR2

A.5.5.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell is in FR2.

The supported test configurations are shown in table A.5.5.3.5.1-1 below. The test parameters are the same as in clause A.4.5.3.3.1 except those described in the following clause. The listed parameter values in Tables A.5.5.3.5.1-2 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-2. The listed parameter values in Tables A.5.5.3.5.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.5.1-4 below.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell (Cell 1), NR has two cells, PSCell (Cell 2) in FR1 and SCell (Cell 3) in FR2. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

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

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

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

**Table A.5.5.3.5.1-1: FR2 SCell activation in non-DRX test configurations with FR1 PSCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 5 | LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.5.5.3.5.1-2: General test parameters for FR2 SCell activation case with FR1 PSCell**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.2 |
| T2 | s | 2 | During this time the UE shall activate the SCell. |

**Table A.5.5.3.5.1-3: Cell specific test parameters for FR2 SCell activation case with FR1 PSCell**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | | | **Cell 3** | | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | | **T3** |
| SSB ARFCN | |  | freq1 | | | freq2 | | | |
| Duplex mode | Config 1,4 |  | FDD | | | TDD | | | |
| Config 2,3,5,6 | TDD | | | TDD | | | |
| TDD configuration | Config 1,4 |  | Not Applicable | | | TDDConf.3.1 | | | |
| Config 2,5 | TDDConf.1.1 | | |
| Config 3,6 | TDDConf.2.1 | | |
| BWchannel | Config 1,4 | MHz | 10: NRB,c = 52 | | | 100: NRB,c = 66 | | | |
| Config 2,5 | 10: NRB,c = 52 | | |
| Config 3,6 | 40: NRB,c = 106 | | |
| Data RBs allocated | Config 1,4 |  | 52 | | | 66 | | | |
| Config 2,5 | 52 | | |
| Config 3,6 | 106 | | |
| BWP BW | Config 1,4 |  | 10: NRB,c = 52 | | | 100: NRB,c = 66 | | | |
| Config 2,5 | 10: NRB,c = 52 | | |
| Config 3,6 | 40: NRB,c = 106 | | |
| DRx Cycle | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | | | SR.3.1 TDD | | | |
| Config 2,5 | SR.1.1 TDD | | |
| Config 3,6 | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel | Config 1,4 |  | CR.1.1 FDD | | | CR.3.1 TDD | | | |
| Config 2,5 | CR.1.1 TDD | | |
| Config 3,6 | CR.2.1 TDD | | |
| RMC CORESET Reference Channel | Config 1,4 |  | CCR.1.1 FDD | | | CCR.3.1 TDD | | | |
| Config 2,5 |  | CCR.1.1 TDD | | |
| Config 3,6 |  | CCR.2.1 TDD | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | | |
| TCI state | |  | NA | | | TCI.State.0 | | | |
| TRS configuration | Config 1,4 |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | | |
| Config 2,5 |  | TRS.1.1 TDD | | |
| Config 3,6 |  | TRS.1.2 TDD | | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | | SSB.1 FR2 | | | |
| Config 3,6 | SSB.2 FR1 | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | kHz | 15 kHz | | | 120 kHz | | | |
| Config 3,6 | 30 kHz | | |
| CSI-RS configuration | Config 1~6 |  | NA | | | NA | | CSI-RS.3.1 TDD Note 5 | |
| CSI reporting periodicity Note 6 | Config 1~6 | ms | NA | | | 5 | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Propagation condition | | - | N/A  Link only, see clause A.3.7A | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 6: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | |

**Table A.5.5.3.5.1-4: OTA related test parameters for FR2 SCell activation case with FR1 PSCell**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 2** | | | **Cell 3** | | | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | | **T3** | |
| Angle of arrival configuration | | |  | NA | | | Setup 1 according to clause A.3.15.1 | | | | |
| Assumption for UE beamsNote 7 | | |  | NA | | | Rough | | | | |
| Note1 | | | dBm/15kHz | Link only, see clause A.3.7A | | | -104.7 | | | | |
| Note1 | | Config 1,2,4,5 | dBm/SCS | -95.7 | | | | |
| Config 3,6 |
| SSB\_RPNote2 | | Config 1,2,4,5 | dBm/SCS Note3 | -∞ | | -88.7 | | -88.7 |
| Config 3,6 |
|  | Config 1,2,3,4,5,6 | | dB | -∞ | | 7 | | 7 |
|  | | | dB | -∞ | | 7 | | 7 |
| IoNote2, Note 4 | Config 1,2,4,5 | | dBm/95.04 MHz | -66.68 | | -58.92 | | -58.92 |
| Config 3,6 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Void  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | | | | | | | |

A.5.5.3.5.2 Test Requirements

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

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot (m+TL1-RSRP), where TL1-RSRP is no larger than

3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, TFirstSSB\_MAX=TSMTC\_MAX=Trs=20ms; TL1-RSRP, measure=480ms and TL1-RSRP, measure=5ms, which allows TL1-RSRP 1000ms.

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

- THARQ is defined in Table A.5.5.3.1.1-2

- Tactivation\_time = 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 1030ms

- TCSI\_Reporting = 10ms

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

During T3 the UE shall stop sending CSI reports for both SCells no later than slot , as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot to , and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe to subframe, as defined in clause 8.3, where TX =20ms, and and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m.

During T3 the starting point of interruption of PSCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3 and the starting point of interruption of E-UTRA PCell during SCell deactivation shall not happen outside the subframe to subframe , where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The interruption of PSCell due to activation of SCell1 and SCell2 shall not be more than the values specified for EN-DC in Clause 8.2.1.2.10.

The interruption of PCell due to activation of SCell1 and SCell2 shall not be more than the values specified for EN-DC in Clause 7.32.2.5 of TS 36.133 [50].

<< End of change >>

<< Unchanged sections skipped >>

<< Start of change >>

### A.5.5.5 Beam Failure Detection and Link recovery procedures

#### A.5.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

##### A.5.5.5.1.1 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 candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.1.1-1, A.5.5.5.1.1-2, A.5.5.5.1.1-3 and A.5.5.5.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.1.1-1 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.5.5.5.1.1-1 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 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

**Table A.5.5.5.1.1-1: Supported test configurations for FR2 PSCell**

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

**Table A.5.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** | **Comment** |
|  | | | |  | **Test 1** |  |
| Active E-UTRA PCell | | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | | |  | 1 |  |
| Active PCell | | | |  | Cell 2 |  |
| RF Channel Number | | | |  | 2 |  |
| Duplex mode | | Config 1, 2 | |  | TDD |  |
| BWchannel | | Config 1, 2 | |  | 100: NRB,c = 66 |  |
| DL initial BWP configuration | | Config 1, 2 | |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | Config 1, 2 | |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | Config 1, 2 | |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | Config 1, 2 | |  | ULBWP.1.1 |  |
| TDD Configuration | | Config 1, 2 | |  | TDDConf.3.1 |  |
| CORESET Reference Channel | | Config 1, 2 | |  | CR.3.1 TDD |  |
| SSB Configuration | | Config 1, 2 | |  | SSB.1 FR2 |  |
| SMTC Configuration | | Config 1, 2 | |  | SMTC.3 |  |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 | |  | 120 KHz |  |
| PRACH Configuration | | Config 1, 2 | |  | FR2 PRACH configuration 2 | A.3.8.3 |
| SSB index assigned as BFD RS (q0) | | | |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | | |  | 1 |  |
| TCI Configuration | | Config 1, 2 | |  | TCI.State.0 |  |
| OCNG parameters | | | |  | OP.1 |  |
| CP length | | | |  | Normal |  |
| Beam | DCI format | | |  | 1-0 |  |
| failure detection | Number of Control OFDM symbols | | |  | 2 |  |
| transmission parameters | Aggregation level | | | CCE | 8 |  |
|  | 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 |  |
| DRX | | | |  | OFF |  |
| Gap pattern ID | | | |  | gp0 |  |
| gapOffset | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | | | dBm/SCS kHz | -94.5 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | | Config 1, 2 |  | CSI-RS.3.1 TDD |  |
| TCI states | | | |  | TCI.State.0 | TCI.State.0 |
| CSI-RS for tracking | | | Config 1, 2 |  | TRS.2.1 TDD |  |
| SSB index assigned as RLM RS | | | |  | 0, 1 |  |
| T310 Timer | | | | ms | 1000 |  |
| N310 | | | |  | 2 |  |
| T1 | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | s | 2.61 |  |
| T3 | | | | s | 1.64 |  |
| T4 | | | | S | 0 |  |
| T5 | | | | s | 1.01 |  |
| D1 | | | | s | 0.97 |  |
| 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.5.5.5.1.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to 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 | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
|  | Config 2 |  | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
|  | Config 2 |  | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/ | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 2 | SCS kHz | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/120 KHz | -104.7 | | | | |
|  | Config 2 |  | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

**Table A.5.5.5.1.1-4: Void**

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**Figure A.5.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.5.5.5.1.2 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 = 960+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

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

#### A.5.5.5.2 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in DRX mode

##### A.5.5.5.2.1 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 FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.2.1-1, A.5.5.5.2.1-2, A.5.5.5.2.1-3, A.5.5.5.2.1-4 and A.5.5.5.2.1-5 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.2.1-1 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.5.5.5.2.1-1 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 5 ms. In the test, DRX configuration is enabled in PCSell 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.5.5.5.2.1-1: Supported test configurations for FR2 PSCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

**Table A.5.5.5.2.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Value** | **Comment** |
|  | | | | |  | **Test 1** |  |
| Active E-UTRA PCell | | | | |  | Cell 1 |  |
| E-UTRA RF Channel Number | | | | |  | 1 |  |
| Active PCell | | | | |  | Cell 2 |  |
| RF Channel Number | | | | |  | 2 |  |
| Duplex mode | | Config 1, 2 | | |  | TDD |  |
| BWchannel | | Config 1, 2 | | |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | Config 1, 2 | | |  | 66 |  |
| DL initial BWP configuration | | Config 1, 2 | | |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | Config 1, 2 | | |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | Config 1, 2 | | |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | Config 1, 2 | | |  | ULBWP.1.1 |  |
| TDD Configuration | | Config 1, 2 | | |  | TDDConf.3.1 |  |
| RMSI CORESET Reference Channel | | Config 1 | | |  | CR.3.1 TDD |  |
| Config 2 | | | CR.3.2 TDD |
| SSB Configuration | | Config 1 | | |  | SSB.1 FR2 |  |
| Config 2 | | |  | SSB.2 FR2 |  |
| SMTC Configuration | | Config 1, 2 | | |  | SMTC.3 |  |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 | | |  | 120 KHz |  |
| PRACH Configuration | | Config 1, 2 | | |  | FR2 PRACH configuration 2 | A.3.8.3 |
| SSB index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | | | |  | 1 |  |
| TCI Configuration | | Config 1, 2 | | |  | TBD |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| Beam failure detection 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 | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | | | | dB | 0 |  |
| DMRS precoder granularity | | | |  | REG bundle size |  |
| REG bundle size | | | |  | 6 |  |
| DRX | | | | |  | DRX.3 | A.3.3.3 |
| Gap pattern ID | | | | |  | N.A. |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | | Config 1 | | dBm/SSB SCS | -94.5 | Threshold used for Qin\_LR\_SSB |
| Config 2 | | -91.5 |
| powerControlOffsetSS | | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | | | | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for CSI reporting | | | Config 1, 2 |  | | CSI-RS.3.1 TDD | A.3.14.2 |
| TCI states | | | |  | | TCI.State.0 | TCI.State.0 |
| CSI-RS for tracking | | | Config 1, 2 |  | | TRS.2.1 TDD |  |
| SSB index assigned as RLM RS | | | |  | | 0, 1 |  |
| T310 Timer | | | | ms | | 1000 |  |
| N310 | | | |  | | 2 |  |
| T1 | | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | 3.37 |  |
| T3 | | | | | s | 2.8 |  |
| T4 | | | | | s | 0 |  |
| T5 | | | | | s | 0.61 |  |
| D1 | | | | | s | 0.57 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | | |

**Table A.5.5.5.2.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to 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 | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
|  | Config 2 |  | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
|  | Config 2 |  | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/SSB | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 2 | SCS | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | Config 1 | dBm/120 KHz | -104.7 | | | | |
|  | Config 2 |  | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.2.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

**Table A.5.5.5.2.1-4: Void**

**Table A.5.5.5.2.1-5: Void**

****

**Figure A.5.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.5.5.5.2.2 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 = 560+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

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

#### A.5.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

##### A.5.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.3.1-1, A.5.5.5.3.1-2, and A.5.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.3.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.5.5.5.3.1-1: Supported test configurations for FR2 PSCell

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

Table A.5.5.5.3.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Test 1 |  |
| Active E-UTRA PCell | |  | Cell 1 |  |
| E-UTRA RF Channel Number | |  | 1 |  |
| Active PSCell | |  | Cell 2 |  |
| RF Channel Number | |  | 2 |  |
| Duplex mode | Config 1 |  | TDD |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1 |  | 66 |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |  |
| CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | A.3.1.2 |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | A.3.10 |
| SMTC Configuration | Config 1 |  | SMTC.3 | A.3.11 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |  |
| PRACH Configuration | Config 1 |  | FR2 PRACH configuration 4 | A.3.8.3 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | |  | 0 |  |
| TRS configuration | |  | TRS.2.1 TDD |  |
| PDSCH/PDCCH TCI state | |  | TCI.State.2 |  |
| OCNG parameters | |  | OP.1 | A.3.2.1 |
| CP length | |  | Normal |  |
| Beam failure detection transmission parameters | DCI format |  | 1-0 |  |
| Number of Control OFDM symbols |  | 2 |  |
| Aggregation level | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
| DMRS precoder granularity |  | REG bundle size |  |
| REG bundle size |  | 6 |  |
| DRX | |  | OFF |  |
| Gap pattern ID | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | dBm/SCS kHz | -94.5 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for q0 and q1 | Config 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| csi-RS-Index assigned as RLM RS | Config 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| T310 Timer | | ms | 1000 |  |
| N310 | |  | 2 |  |
| T1 | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | s | 1.17 |  |
| T3 | | s | 0.9 |  |
| T4 | | s | 0 |  |
| T5 | | s | 0.31 |  |
| D1 | | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

**Table A.5.5.5.3.1-3: Cell specific test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS kHz | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/15 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.3.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

**Table A.5.5.5.3.1-4: Void**

**Table A.5.5.5.3.1-5: Void**



Figure A.5.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

##### A.5.5.5.3.2 Test Requirements

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

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

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

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

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

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

#### A.5.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in DRX mode

##### A.5.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.4.1-1, A.5.5.5.4.1-2, A.5.5.5.4.1-3, and A.5.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.4.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in 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.5.5.5.4.1-1: Supported test configurations for FR2 PSCell**

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

**Table A.5.5.5.4.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Test 1 |  |
| Active E-UTRA PCell | |  | Cell 1 |  |
| E-UTRA RF Channel Number | |  | 1 |  |
| Active PSCell | |  | Cell 2 |  |
| RF Channel Number | |  | 2 |  |
| Duplex mode | Config 1 |  | TDD |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1 |  | 66 |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |  |
| CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | A.3.1.2 |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | A.3.10 |
| SMTC Configuration | Config 1 |  | SMTC.3 | A.3.11 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |  |
| PRACH Configuration | Config 1 |  | FR2 PRACH configuration 4 | A.3.8.3 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | |  | 0 |  |
| TRS configuration | |  | TRS.2.1 TDD |  |
| PDSCH/PDCCH TCI state | |  | TCI.State.2 |  |
| OCNG parameters | |  | OP.1 | A.3.2.1 |
| CP length | |  | Normal |  |
| Beam failure detection transmission parameters | DCI format |  | 1-0 |  |
| Number of Control OFDM symbols |  | 2 |  |
| Aggregation level | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
| DMRS precoder granularity |  | REG bundle size |  |
| REG bundle size |  | 6 |  |
| DRX | |  | DRX.3 | A.3.3.3 |
| Gap pattern ID | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | dBm/SCS kHz | -94.5 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS configuration for q0 and q1 | Config 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| csi-RS-Index assigned as RLM RS | Config 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| T310 Timer | | ms | 1000 |  |
| N310 | |  | 2 |  |
| T1 | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | s | 5.43 |  |
| T3 | | s | 5.16 |  |
| T4 | | s | 0 |  |
| T5 | | s | 0.31 |  |
| D1 | | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

**Table A.5.5.5.4.1-3: Cell specific test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to 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\_CSI-RS of set q0 | Config 1 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS kHz | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/15 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.4.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

Table A.5.5.5.4.1-4: Void

Table A.5.5.5.4.1-5: Void

Table A.5.5.5.4.1-6: Void

****

**Figure A.5.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

##### A.5.5.5.4.2 Test Requirements

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

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

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

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

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

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

#### A.5.5.5.5 EN-DC scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

##### A.5.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements for SSB based beam failure detection and link recovery for an FR2 serving cell in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.5.5.5.5.1-1, A.5.5.5.5.1-2 and A.5.5.5.5.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.5.1-3 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.5.5.5.5.1-3 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 5ms. This test will focus on the scheduling availability during beam failure detection and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

**Table A.5.5.5.5.1-1: Supported test configurations for FR2 PSCell**

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

**Table A.5.5.5.5.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| **Test 1** |  |
| Active E-UTRA PCell | |  | Cell 1 |  |
| E-UTRA RF Channel Number | |  | 1 |  |
| Active PSCell | |  | Cell 2 |  |
| RF Channel Number | |  | 2 |  |
| Duplex mode | Config 1,2 |  | TDD |  |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1,2 |  | 66 |  |
| TDD Configuration | Config 1,2 |  | TDDConf.3.1 |  |
| DL initial BWP configuration | Config 1, 2 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | Config 1, 2 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | Config 1, 2 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | Config 1, 2 |  | ULBWP.1.1 |  |
| CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD |  |
| SSB Configuration | Config 1,2 |  | SSB.1 FR2 |  |
| SMTC Configuration | Config 1,2 |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | Config 1,2 |  | 120 KHz |  |
| PRACH Configuration | Config 1,2 |  | FR2 PRACH configuration 2 | A.3.8.3 |
| SSB index assigned as BFD RS (q0) | |  | 0 |  |
| SSB index assigned as CBD RS (q1) | |  | 1 |  |
| TRS configuration | |  | TRS.2.1 TDD |  |
| TCI configuration | |  | TCI.State.0 |  |
| OCNG parameters | |  | OP.1 |  |
| CP length | |  | Normal |  |
| Beam failure detection 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 | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | dB | 0 |  |
| DMRS precoder granularity |  | REG bundle size |  |
| REG bundle size |  | 6 |  |
| DRX | |  | OFF | DRX is not in use |
| Gap pattern ID | |  | N.A. | No measurement gap pattern is configured |
| ssb-Index | |  | 2 | Number of SSB indexes used for beam failure detection |
| rlmInSyncOutOfSyncThreshold | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | dBm/SCS kHz | -94.5 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI-RS Configuration for reporting | Config 1, 2 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| T310 Timer | | ms | 1000 |  |
| N310 | |  | 2 |  |
| T1 | | s | 1 | During this time the UE shall be fully synchronized to cell 1 |
| T2 | | s | 2.6 |  |
| T3 | | s | 1.64 |  |
| T4 | | s | 0 |  |
| T5 | | s | 1.01 |  |
| D1 | | s | 0.97 |  |
| 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.5.5.5.5.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | | | |
|  | |  | T1 | T2 | T3 | T4 | T5 |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beamsNote 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to 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 | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
|  | Config 2 |  | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
|  | Config 2 |  | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/ | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 2 | SCS kHz | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/15KHz | -104.7 | | | | |
|  | Config 2 |  | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.5.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

****

**Figure A.5.5.5.5.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

##### A.5.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

* The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

* The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

<< End of change >>

<< Unchanged sections skipped >>

<< Start of change >>

#### A.5.5.7.1 Addition and Release Delay of NR PSCell

##### A.5.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 of TS 36.133 [15] for the case when the PSCell is unknown by the UE at the time of addition.

Supported test configurations are shown in A.5.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.2-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.5.5.7.1.1-2, cell-specific parameters in A.5.5.7.1.1-3 and OTA parameters in A.5.5.7.1.1-4 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

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 T1. 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 T2.

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

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

Table A.5.5.7.1.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell |
| Initial Condition | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Neighbour cell | Cell2 | Neighbour cell on RF channel number 2. |
| Final Condition | Active PCell | Cell1 | PCell on RF channel number 1. |
| Neighbour Cell | Cell2 | PSCell released on RF channel number 2. |
| B1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event B1. |
| Threshold RSRP | dBm | -118 | Actual RSRP threshold for event B1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| Time to Trigger | s | 0 |  |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| PRACH configuration on cell2 | |  | FR2 configuration 2 | Captured in A.3.8.3.2 |
| CQI/PMI periodicity and offset configuration index on cell2 | |  | TBD | 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 | 1 | During this time the UE adds the PSCell. |
| T3 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T4 | | s | 1 | During this time the UE releases the PSCell. |

Table A.5.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | | |
| T1 | T2 | T3 | T4 |
| E-UTRA Channel Number |  | 1,2 | 1 | | | |
| NR Channel Number |  | 1,2 | 2 | | | |
| Duplex Mode |  | 1,2 | TDD | | | |
| TDD configuration |  | 1,2 | TDDConf.3.1 | | | |
| BWchannel | MHz | 1,2 | 100: NRB,c = 66 | | | |
| Data RBs allocated |  | 1,2 | 48 | | | |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | | | |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | | | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | | |
| PDSCH/PDCCH TCI state |  | 1 | TCI.State.2 | | | |
| PDSCH Reference measurement channel |  | 1,2 | SR.3.3 TDD | | | |
| RMSI CORESET Reference Channel |  | 1,2 | CR.3.2 TDD | | | |
| Dedicated CORESET Reference Channel |  | 1,2 | CCR.3.7 TDD | | | |
| OCNG Patterns |  | 1,2 | OP.3 | | | |
| SSB configuration |  | 1,2 | SSB.2 FR2 | | | |
| SMTC configuration |  | 1,2 | SMTC.2 | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 120 | | | |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD | | | |
| EPRE ratio of PSS to SSS | dB | 1,2 | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |
| Propagation condition |  | 1,2 | AWGN | | | |

Table A.5.5.7.1.1-4: OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | | |
| T1 | T2 | T3 | T4 |
| Angle of arrival configuration |  | Setup 2a according to clause A.3.15.2.1 | | | |
| Assumption for UE beamsNote 6 |  | Rough | | | |
| Ês Note2 | dBm/SCS | -∞ | -81 | | |
| SSB\_RPNote 2, Note 4 | dBm/SCS | -∞ | -81 | | |
| BB Note 2, Note 7 | dB | -∞ | 4.88 | | |
| IoNote 2, Note 4 | dBm/95.04 MHz | N/A | -56.41 | | |
| Note 1: Void  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  Note 7: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | |

##### A.5.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 582 msNote1 into T2.

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

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

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

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

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 of TS 36.133 [15]:

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

Where:

TRRC\_delay = 20ms

Tprocessing = 40ms

Tsearch = 8\*3\*20 = 480 ms

T∆ = 20ms

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

<< End of change >>

<< Unchanged sections skipped >>

<<Start of change>>

#### A.5.6.2.5 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

##### A.5.6.2.5.1 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 9.3.4.

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 FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.5.1-1, A.5.6.2.5.1-2, and A.5.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.5.1-2 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 A4 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.5.6.2.5.1-1.

Table A.5.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Table A.5.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| 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 | | One FR1 and one FR2 NR carrier frequency is used. |
| 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. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 39 | 39 |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 2,5 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 3,6 | SSB.2 FR1 | | As specified in clause A.3.10.1 |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3,4,5,6 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| CSI-RS for tracking |  | Config 1,4 | TRS.1.1 FDD | |  |
|  | Config 2,5 | TRS.1.1 TDD | |  |
|  | Config 3,6 | TRS.1.2 TDD | |  |
| *offsetMO* | dB | Config 1,2,3,4,5,6 | 6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | |  |
| 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 1,4 | 3ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  | Config 2,3,5,6 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6 | 5.2 for PC1; 3.5 for other PC | 5.2 for PC1; 3.5 for other PC |  |

Table A.5.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | Cell 3 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | Config 1,2,3,4,5,6 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Assumption for UE beamsNote 7 |  | Config 1,2,3,4,5,6 | N/A | | Rough | |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | TDD | |
|  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | Config 1,4 | 52 | | 66 | |
| Config 2,5 | 52 | | 66 | |
| Config 3,6 | 106 | | 66 | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | Config 3,6 | TDDConf.2.1 | | TDDConf.3.1 | |
| 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 | |
| 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 FDD | | - | |
|  | Config 2,5 | SR.1.1 TDD | |
|  | Config 3,6 | SR2.1 TDD | |
| RMSI CORESET Reference  Channel |  | Config 1,4 | CR.1.1 FDD | | - | |
|  | Config 2,5 | CR.1.1 TDD | |
|  | Config 3,6 | CR2.1 TDD | |
| Dedicated CORESET RMC configuration |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  |  | Config 2,5 | CCR.1.1 TDD | |  | |
|  |  | Config 3,6 | CCR.2.1 TDD | |  | |
|  |  | Config 1,4 | CCR.1.1 FDD | | - | |
| SMTC configuration defined in A.3.11 |  | Config 1,4 | SMTC.2 | | SMTC.2 | |
|  | Config 2,3,5,6 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | 120 | |
| Config 3,6 | 30 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2,3,4,5,6 | 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) |  |  |  | |  | |
| Ês | dBm/SCS | Config 1,2,3,4,5,6 |  | | -Infinity | -87 |
| SSB\_RP Note 3 | dBm/SCS  Note5 | Config 1,2,3,4,5,6 |  | | -Infinity | -87 |
| BB Note 8 | dB | Config 1,2,3,4,5,6 | Link only, see clause A.3.7A | | -Infinity | 14.69 |
| IoNote3 | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6 |  | | -Infinity | -58.01 |
| 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: Void  Note 3: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void.  Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.5.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

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

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.5.6.2.6 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

##### A.5.6.2.6.1 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 9.3.4.

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 FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.6.1-1, A.5.6.2.6.1-2, and A.5.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.6.1-2 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 A4 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.5.6.2.6.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Table A.5.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| 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 | | | | One FR1 and one FR2 NR carrier frequency is used. |
| 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. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 39 | | 39 | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2,5 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 3,6 | SSB.2 FR1 | | | | As specified in clause A.3.10.1 |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3,4,5,6 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| CSI-RS for tracking |  | Config 1,4 | TRS.1.1 FDD | | | |  |
|  | Config 2,5 | TRS.1.1 TDD | | | |  |
|  | Config 3,6 | TRS.1.2 TDD | | | |  |
| *offsetMO* | dB | Config 1,2,3,4,5,6 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | | | |  |
| 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.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| 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 1,4 | 3ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  | Config 2,3,5,6 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC |  |

Table A.5.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | Cell 3 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | Config 1,2,3,4,5,6 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Assumption for UE beamsNote 7 |  | Config 1,2,3,4,5,6 | N/A | | Rough | |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | TDD | |
|  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | Config 1,4 | 52 | | 66 | |
| Config 2,5 | 52 | | 66 | |
| Config 3,6 | 106 | | 66 | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | Config 3,6 | TDDConf.2.1 | | TDDConf.3.1 | |
| 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 | |
| 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 FDD | | - | |
|  | Config 2,5 | SR.1.1 TDD | |
|  | Config 3,6 | SR2.1 TDD | |
| RMSI CORESET Reference  Channel |  | Config 1,4 | CR.1.1 FDD | | - | |
|  | Config 2,5 | CR.1.1 TDD | |
|  | Config 3,6 | CR2.1 TDD | |
| Dedicated CORESET RMC configuration |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  |  | Config 2,5 | CCR.1.1 TDD | |  | |
|  |  | Config 3,6 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11 |  | Config 1,4 | SMTC.2 | | SMTC.2 | |
|  | Config 2,3,5,6 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | 120 | |
| Config 3,6 | 30 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2,3,4,5,6 | 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 Note5 |  | N/A  Link only, see clause A.3.7A | | -104.7 | |
| Note2 | dBm/SCS Note4 | Config 1,2,4,5 | -95.7 | |
| Config 3,6 | -95.7 | |
| SSB\_RP Note 3 | dBm/SCS Note5 | Config 1,2,4,5 | -Infinity | -86.7 |
| Config 3,6 | -Infinity | -86.7 |
|  | dB | Config 1,2,3,4,5,6 | -Infinity | 9 |
|  | dB | Config 1,2,3,4,5,6 | -Infinity | 9 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 | - | - |
| dBm/38.16MHz | Config 3,6 | - | - |
| dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6 | -66.7 | -57.2 |
| 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

##### A.5.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

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

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.5.6.2.7 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

##### A.5.6.2.7.1 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 9.3.4.

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 FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.7.1-1, A.5.6.2.7.1-2, and A.5.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.7.1-2 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 A4 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.5.6.2.7.1-1.

Table A.5.6.2.7.1-1: EN-DC event triggered reporting tests with SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Table A.5.6.2.7.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| 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 | | One FR1 and one FR2 NR carrier frequency is used. |
| 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. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 39 | 39 |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 2,5 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 3,6 | SSB.2 FR1 | | As specified in clause A.3.10.1 |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3,4,5,6 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| CSI-RS for tracking |  | Config 1,4 | TRS.1.1 FDD | |  |
|  | Config 2,5 | TRS.1.1 TDD | |  |
|  | Config 3,6 | TRS.1.2 TDD | |  |
| *offsetMO* | dB | Config 1,2,3,4,5,6 | 6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | |  |
| 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 1,4 | 3ms | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  | Config 2,3,5,6 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | |  |
| T2 | s | Config 1,2,3,4,5,6 | 7 for PC1; 4.5 for other PC | 7 for PC1; 4.5 for other PC |  |

Table A.5.6.2.7.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | Cell 3 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | Config 1,2,3,4,5,6 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Assumption for UE beamsNote 7 |  | Config 1,2,3,4,5,6 | N/A | | Rough | |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | TDD | |
|  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | Config 1,4 | 52 | | 66 | |
| Config 2,5 | 52 | | 66 | |
| Config 3,6 | 106 | | 66 | |
| 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 FDD | | - | |
|  | Config 2,5 | SR.1.1 TDD | |
|  | Config 3,6 | SR2.1 TDD | |
| RMSI CORESET Reference  Channel |  | Config 1,4 | CR.1.1 FDD | | - | |
|  | Config 2,5 | CR.1.1 TDD | |
|  | Config 3,6 | CR2.1 TDD | |
| Dedicated CORESET RMC configuration |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  |  | Config 2,5 | CCR.1.1 TDD | |  | |
|  |  | Config 3,6 | CCR.2.1 TDD | |  | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | Config 3,6 | TDDConf.2.1 | | TDDConf.3.1 | |
| 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 | |
| SMTC configuration defined in A.3.11 |  | Config 1,4 | SMTC.2 | | SMTC.2 | |
|  | Config 2,3,5,6 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | 120 | |
| Config 3,6 | 30 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2,3,4,5,6 | 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) |  |  |  | |  | |
| Ês | dBm/SCS | Config 1,2,3,4,5,6 |  | | -Infinity | -87 |
| SSB\_RP Note 3 | dBm/SCS  Note5 | Config 1,2,3,4,5,6 |  | | -Infinity | -87 |
| BB Note 8 | dB | Config 1,2,3,4,5,6 | Link only, see clause A.3.7A | | -Infinity | 14.69 |
| IoNote3 | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6 |  | | -Infinity | -58.01 |
| 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: Void  Note 3: SS-RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.5.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

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

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.5.6.2.8 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

##### A.5.6.2.8.1 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 9.3.4.

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 FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.8.1-1, A.5.6.2.8.1-2, and A.5.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.8.1-2 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 A4 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.5.6.2.8.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.8.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| Config | Description of serving cell | Description of target cell |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Table A.5.6.2.8.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | | | Comment |
| 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 | | | | One FR1 and one FR2 NR carrier frequency is used. |
| 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. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR cell 3 | | | | NR cell 3 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6 | 0 | | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6 | 39 | | 39 | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2,5 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 3,6 | SSB.2 FR1 | | | | As specified in clause A.3.10.1 |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3,4,5,6 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| CSI-RS for tracking |  | Config 1,4 | TRS.1.1 FDD | | | |  |
|  | Config 2,5 | TRS.1.1 TDD | | | |  |
|  | Config 3,6 | TRS.1.2 TDD | | | |  |
| *offsetMO* | dB | Config 1,2,3,4,5,6 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | | | |  |
| 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.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| 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 1,4 | 3ms | | | | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  | Config 2,3,5,6 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 | | | |  |
| T2 | s | Config 1,2,3,4,5,6 | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC |  |

Table A.5.6.2.8.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | Cell 3 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | Config 1,2,3,4,5,6 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Assumption for UE beamsNote 7 |  | Config 1,2,3,4,5,6 | N/A | | Rough | |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | | 2 | |
| Duplex mode |  | Config 1,4 | FDD | | TDD | |
|  | Config 2,3,5,6 | TDD | | TDD | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2,5 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3,6 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | Config 1,4 | 52 | | 66 | |
| Config 2,5 | 52 | | 66 | |
| Config 3,6 | 106 | | 66 | |
| 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 FDD | | - | |
|  | Config 2,5 | SR.1.1 TDD | |
|  | Config 3,6 | SR2.1 TDD | |
| RMSI CORESET Reference Channel |  | Config 1,4 | CR.1.1 FDD | | - | |
|  | Config 2,5 | CR.1.1 TDD | |
|  | Config 3,6 | CR2.1 TDD | |
| Dedicated CORESET RMC configuration |  | Config 1,4 | CCR.1.1 FDD | | - | |
|  |  | Config 2,5 | CCR.1.1 TDD | |  | |
|  |  | Config 3,6 | CCR.2.1 TDD | |  | |
| TDD configuration |  | Config 2,5 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | Config 3,6 | TDDConf.2.1 | | TDDConf.3.1 | |
| 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 | |
| SMTC configuration defined in A.3.11 |  | Config 1,4 | SMTC.2 | | SMTC.2 | |
|  | Config 2,3,5,6 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2,4,5 | 15 | | 120 | |
| Config 3,6 | 30 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2,3,4,5,6 | 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 Note5 |  | N/A  Link only, see clause A.3.7A | | -104.7 | |
| Note2 | dBm/SCS Note4 | Config 1,2,4,5 | -95.7 | |
| Config 3,6 | -95.7 | |
| SSB\_RP Note 3 | dBm/SCS Note5 | Config 1,2,4,5 | -Infinity | -86.7 |
| Config 3,6 | -Infinity | -86.7 |
|  | dB | Config 1,2,3,4,5,6 | -Infinity | 9 |
|  | dB | Config 1,2,3,4,5,6 | -Infinity | 9 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 | - | - |
| dBm/38.16MHz | Config 3,6 | - | - |
| dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6 | -66.7 | -57.2 |
| 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

##### A.5.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

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

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.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

#### A.5.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

##### A.5.6.3.3.1 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 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.3.1-1.

Table A.5.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

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

##### A.5.6.3.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.3.2-1 and Table A.5.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.3.2-1.

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

Table A.5.6.3.3.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Value** |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | 1~2 |  | 66 |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD |
| SSB configuration | 1~2 |  | SSB.1 FR2 |
| CSI-RS configuration | 1~2 |  | CSI-RS.3.3 TDD |
| 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 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| DRX configuration | 1~2 |  | Off |
| reportConfigType | 1~2 |  | aperiodic |
| reportQuantity | 1~2 |  | cri-RSRP |
| Number of reported RS | 1~2 |  | 2 |
| qcl-Info | 1~2 |  | SSB#0 for resource#0 |
| SSB#1 for resource#1 |
| reportSlotOffsetList | 1~2 |  | 8 |
| Propagation condition | 1~2 |  | AWGN |
| T1 | 1~2 | s | 5 |
| EPRE ratio of PSS to SSS | 1~2 | 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 |
| 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. | | | |

Table A.5.6.3.3.2-1: CSI-RS specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **CSI-RS#0** | **CSI-RS#1** |
| Angle of arrival configuration | 1~2 |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 | 1~2 |  | Rough | |
| Note1 | 1~2 | dBm/15kHz | -105 | |
| Note1 | 1~2 | dBm/SSB SCS | -95.97 | |
|  | 1~2 | dB | 0 | 9 |
| CSI-RS RSRP Note2 | 1~2 | dBm/SSB SCS | -95.97 | -86.97 |
| Io Note2 | 1~2 | dBm/95.04MHz | -63.97 | -57.47 |
|  | 1~2 | dB | 0 | 9 |
| 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: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

##### A.5.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.6.3.3.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.6.3.3.3-1: L1-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| CSI-RS0 | CSI-RS \_RP0 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP0 +δ + Gmax |
| CSI-RS1 | CSI-RS \_RP1 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP1 +δ + Gmax |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

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.

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.5.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

##### A.5.6.3.4.1 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 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.4.1-1.

Table A.5.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

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

##### A.5.6.3.4.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.4.2-1 and Table A.5.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.4.2-1.

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

Table A.5.6.3.4.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1~2 |  | freq1 |
| Duplex mode | 1~2 |  | TDD |
| TDD Configuration | 1~2 |  | TDDConf.3.1 |
| BWchannel | 1~2 | MHz | 100: NRB,c = 66 |
| Data RBs allocated | 1~2 |  | 66 |
| PDSCH Reference measurement channel | 1~2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | 1~2 |  | CR.3.1 TDD |
| Dedicated CORESET Reference Channel | 1~2 |  | CCR.3.1 TDD |
| SSB configuration | 1~2 |  | SSB.1 FR2 |
| CSI-RS configuration | 1~2 |  | CSI-RS.3.3 TDD |
| 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 |
| SMTC configuration | 1~2 |  | SMTC.1 |
| TRS Configuration | 1~2 |  | TRS.2.1 TDD |
| PDCCH/PDSCH TCI Configuration | 1~2 |  | TCI.State.2 |
| DRX configuration | 1~2 |  | DRX.3 |
| reportConfigType | 1~2 |  | aperiodic |
| reportQuantity | 1~2 |  | cri-RSRP |
| Number of reported RS | 1~2 |  | 2 |
| qcl-Info | 1~2 |  | SSB#0 for resource#0 |
| SSB#1 for resource#1 |
| reportSlotOffsetList | 1~2 |  | 8 |
| Propagation condition | 1~2 |  | AWGN |
| T1 | 1~2 | s | 5 |
| EPRE ratio of PSS to SSS | 1~2 | 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 |
| 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. | | | |

Table A.5.6.3.4.2-1: CSI-RS specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | CSI-RS#0 | CSI-RS#1 |
| Angle of arrival configuration | 1~2 |  | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 4 | 1~2 |  | Rough | |
| Note1 | 1~2 | dBm/15kHz | -105 | |
| Note1 | 1~2 | dBm/SSB SCS | -95.97 | |
|  | 1~2 | dB | 0 | 9 |
| CSI-RS RSRP Note2 | 1~2 | dBm/SSB SCS | -95.97 | -86.97 |
| Io Note2 | 1~2 | dBm/95.04MHz | -63.97 | -57.47 |
|  | 1~2 | dB | 0 | 9 |
| 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: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | |

##### A.5.6.3.4.3 Test Requirements

After1440ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.6.3.4.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.6.3.4.3-1: L1-RSRP absolute accuracy test requirement

|  |  |
| --- | --- |
|  | Test requirement Notes1,2,3 |
| CSI-RS0 | CSI-RS \_RP0 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP0 +δ + Gmax |
| CSI-RS1 | CSI-RS \_RP1 -δ + Gmin ≤ Reported RSRP(dBm) ≤CSI-RS \_RP1 +δ + Gmax |
| Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration  Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the Io used in the test  Note 3: Gmin and Gmax are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class | |

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.

<<End of change>>

<<Unchanged sections skipped>>

<< Start of change >>

#### A.5.7.1.3 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

##### A.5.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.5.7.1.3.1-1.

Table A.5.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

##### A.5.7.1.3.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2 below. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.3.2-1: SS-RSRP inter-frequency test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN | 1~6 |  | freq1 | freq2 | freq1 | freq2 |
| BWchannel | 1,4 | MHz | 10:  NRB,c = 52 | 100:  NRB,c = 66 | 10:  NRB,c = 52 | 100:  NRB,c = 66 |
| 2,5 | 10:  NRB,c = 52 | 10:  NRB,c = 52 |
| 3,6 | 40:  NRB,c = 106 | 40:  NRB,c = 106 |
| Data RBs allocated | 1,2,4,5 |  | 52 | 24 | 52 | 66 |
| 3,6 | 106 | 106 |
| Gap pattern ID |  |  | 0 | | 0 | |
| Duplex mode | 1,4 |  | FDD | TDD | FDD | TDD |
| 2,5 | TDD | TDD |
| 3,6 | TDD | TDD |
| TDD configuration | 1,4 |  | N/A | TDDConf.3.1 | N/A | TDDConf.3.1 |
| 2,5 | TDDConf.1.1 | TDDConf.1.1 |
| 3,6 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH Reference measurement channel | 1,4 |  | SR.1.1 FDD | - | SR.1.1 FDD | - |
| 2,5 | SR.1.1 TDD | SR.1.1 TDD |
| 3,6 | SR.2.1 FDD | SR.2.1 FDD |
| RMSI CORESET Reference Channel | 1,4 |  | CR.1.1 FDD | - | CR.1.1 FDD | - |
| 2,5 | CR.1.1 TDD | - | CR.1.1 TDD | - |
| 3,6 | CR.2.1 FDD | - | CR.2.1 FDD | - |
| Dedicated CORESET Reference Channel | 1,4 |  | CCR.1.1 FDD | - | CCR.1.1 FDD | - |
| 2,5 |  | CCR.1.1 TDD | - | CCR.1.1 TDD | - |
| 3,6 |  | CCR.2.1 TDD | - | CCR.2.1 TDD | - |
| SSB configuration | 1,4 |  | SSB.1 FR1 | SSB.3 FR2 | SSB.1 FR1 | SSB.3 FR2 |
| 2,5 | SSB.1 FR1 | SSB.1 FR1 |
| 3,6 | SSB.2 FR1 | SSB.2 FR1 |
| OCNG Patterns | 1~6 |  | OP.1 | OP.3 | OP.1 | OP.1 |
| Initial BWP Configuration | 1~6 |  | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Dedicated BWP configuration | 1~6 |  | DLBWP.1.3  ULBWP.1.3 | | DLBWP.1.3  ULBWP.1.3 | |
| TRS Configuration | 1~6 |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| PDCCH/PDSCH TCI Configuration | 1~6 |  | TCI.State.2 | | TCI.State.2 | |
| SMTC configuration | 1~6 |  | SMTC.1 | | SMTC.1 | |
| Time offset between Cell 2 and Cell 3 | 1~6 | μs | 3 | | 3 | |
| EPRE ratio of PSS to SSS | 1~6 | dB | 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation condition | 1~6 | - | NA  Link only, see clause A.3.7A | AWGN | NA  Link only, see clause A.3.7A | AWGN |
| Antenna configuration | 1~6 | - | 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: Void | | | | | | |

Table A.5.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | | Test 2 NOTE 3 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Angle of arrival configuration according to clause A.3.15 |  |  | NA | Setup 2b | NA | Setup 2b |
| Assumption for UE beamsNote 4 |  |  | N/A | Rough | N/A | Rough |
|  | 1~6 | dBm/15kHz | NA  Link only, see clause A.3.7A | -90 | NA  Link only, see clause A.3.7A | NA |
|  | 1~6 | dBm/SSB SCS | -80.97 | NA |
|  | 1~6 | dB | 5 | NA |
|  |  |  |  |  |
| Es | 1~6 | dBm/SCS |  | (Table B.2.3-2 Spherical coverage +1dB) |
| SSB\_RPNote1 | 1~6 | dBm/SCS | -76.0 | (Table B.2.3-2 Spherical coverage +1dB) |
| BBNote6 | 1~6 | dB | 4.35 | -3.81 |
| IoNote1 | 1~6 | dBm/  95.04MHz | -50.18 | SSB\_RP+28.98 |
|  |  |  |  |  |
| Note 1: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Void  Note 3: No additional noise is added by the test system in Test 2.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  Note 5: Where used, 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 6: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.5.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 3 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

<< End of change >>

<< Unchanged sections skipped >>

<<Start of change>>

### A.5.7.2 SS-RSRQ

#### A.5.7.2.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

###### A.5.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.8.1.1.

###### A.5.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.5.7.2.1.2-2 and Table A.5.7.2.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

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

Table A.5.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN | |  | Freq1 | | Freq1 | |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | 66 | | 66 | |
| 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 | | | |
| TRS configuration | |  | TRS.2.1 TDD |  | TRS.2.1 TDD |  |
| TCI state | |  | TCI.State.0 |  | TCI.State.0 |  |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Control channel RMC | |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration | |  | SMTC.1 | | | |
| SSB configuration | |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement | |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | | dB | 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\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | |

Table A.5.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 9 |  | Rough | | | |
| Note1 | dBm/15kHzNote4 | -95 | | -95 | |
| Note1 | dBm/SCSNote3 | -86 | | -86 | |
|  | dB | 3 | 3 | -3 | -3 |
| SSB\_RPNote2 | dBm/SCS Note4 | -83 | -83 | -89 | -89 |
| SS-RSRQ Note2 | dB | -14.77 | -14.77 | -16.81 | -16.81 |
|  | dB | -1.76 | -1.76 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -50 | | --54 | -54 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

###### A.5.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.8.1.1. Nominal SS-RSRQ is the value shown in table A.5.7.2.1.2-3.

#### A.5.7.2.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.5.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

##### A.5.7.2.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test setup in Table A.5.7.2.2.2-2 and Table A.5.7.2.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.5.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.5.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN |  | Freq1 | freq2 | freq1 | Freq2 |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 66 | | 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| CSI-RS for tracking |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | |

Table A.5.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| AoA setup |  | Setup 1 in clause in clause A.3.15 | | Setup 1 in clause in clause A.3.15 | |
| Assumption for UE beamsNote 8 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -94.03 | | -94.03 | |
| Note1 | dBm/SCSNote3 | -85.0 | | -85.0 | |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| SSB\_RPNote2 | dBm/SCS Note4 | -86.75 | -86.75 | -88 | -88 |
| SS-RSRQNote2 | dB | -14.75 | -14.75 | -15.56 | -15.56 |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| IoNote2 | dBm/95.04 MHz Note4 | -53.8 | -53.8 | -54.25 | -54.25 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.5.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ+3.5dB to Nominal SS-RSRQ-3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

### A.5.7.3 SS-SINR

#### A.5.7.3.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.5.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.13.1.1.

##### A.5.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.5.7.3.1.2-2 and Table A.5.7.3.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

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

Table A.5.7.3.1.2-2: SS-SINR Intra frequency test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN |  | Freq2 | | Freq2 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 66 | | 66 | |
| 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 | | | |
| DRX cycle configuration | ms | Not applicable | | | |
| TRS configuration |  | TRS.2.1 TDD | | | |
| TCI state |  | TCI.State.0 | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated RMSI CORESET Reference Channel |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | | | |
| SSB configuration |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | dB | 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | |

Table A.5.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 9 |  | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | |
|  | dB | 4.54 | 2.66 | -3 | -3 |
| SS-RSRPNote2 | dBm/SCS Note4 | -91.46 | -93.34 | -99 | -99 |
| SS-SINR Note2 | dB | 0 | -3.2 | -4.76 | -4.76 |
|  | dB | 0 | -3.2 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | 59.43 | | -64 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-SINR, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.5.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1. Nominal SS-SINR is the value shown in table A.5.7.3.1.2-3.

#### A.5.7.3.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.5.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

##### A.5.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test setup in Table A.5.7.3.2.2-2 and Table A.5.7.3.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

**Table A.5.7.3.2.2-2: SS-SINR Inter frequency SS-SINR supported test configurations**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A. 5.7.3.2.2-2: SS-SINR Inter frequency general test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| SSB ARFCN |  | Freq1 | freq2 | freq1 | Freq2 | freq1 | Freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 66 | | 66 | | 66 | |
| 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 | | | | | |
| DRX cycle configuration | ms | Not applicable | | | | | |
| TRS configuration |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 | 120 | 120 |
| 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
|  |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | | | |

**Table A.5.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Angle of arrival configuration | degrees | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 10 |  | Rough | | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | | -96 | |
|  | dB | -0.5 | -0.5 | 11 | 11. | -3.0 | -3.0 |
| SS-RSRPNote2 | dBm/SCS Note4 | -96.5 | -96.5 | -85 | -85 | -99 | -99 |
| SS-SINRNote2 | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
|  | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
| IoNote2 | dBm/95.04 MHz Note4 | -69.3 | | -55.4 | | -65.24 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-SINR, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Void  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | | | |

##### A.5.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3dB to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR+3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1. Nominal SS-SINR is the value shown in table A.5.7.2.2.2-3

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

A.6.5.2 Interruption

#### A.6.5.2.1 Interruptions during measurements on deactivated NR SCC in FR1

A.6.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.6.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.6.5.2.1.1-2 and A 6.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, PCell is continuously scheduled in DL.

Table A.6.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

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

Table A.6.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

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

Table A.6.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell1** | **Cell2** |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1 |  | FDD | FDD |
| Config 2,5 | TDD | TDD |
| Confiq 3 | TDD | FDD |
| Confiq 4 | FDD | TDD |
| TDD configuration | Config 1 |  | Not Applicable | Not Applicable |
| Config 2 | TDDConf.1.1 | TDDConf.1.1 |
| Config 3 | TDDConf.1.1 | Not Applicable |
| Confiq 4 | Not Applicable | TDDConf.1.1 |
| Confiq 5 | TDDConf.2.1 | TDDConf.2.1 |
| BWchannel | Config 1,2,3,4 |  | Note 9 | Note 9 |
| Config 5 | Note 9 | Note 9 |
| BWoccupied | Config 1,2,3,4 | RB | 52 Note 7 | 52 Note 7 |
| Config 5 | 106 Note 8 | 106 Note 8 |
| Initial DL BWP Configuration | Config 1,2,3,4 |  | DLBWP.0.1 | DLBWP.0.1 |
| Config 5 |  | DLBWP.0.1 | DLBWP.0.1 |
| Dedicated DL BWP Configuration | Config 1,2,3,4 |  | DLBWP.1.1 | DLBWP.1.1 |
| Config 5 |  | DLBWP.1.1 | DLBWP.1.1 |
| Initial UL BWP Configuration | Config 1,2,3,4 |  | ULBWP.0.1 | ULBWP.0.1 |
| Config 5 |  | ULBWP.0.1 | ULBWP.0.1 |
| Dedicated UL BWP Configuration | Config 1,2,3,4 |  | ULBWP.1.1 | ULBWP.1.1 |
| Config 5 |  | ULBWP.1.1 | ULBWP.1.1 |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | SR.1.1 FDD |
| Config 2 | SR.1.2 TDD | SR.1.2 TDD |
| Config 3 | SR.1.2 TDD | SR.1.1 FDD |
| Confiq 4 | SR.1.1 FDD | SR.1.2 TDD |
| Confiq 5 | SR.2.1 TDD | SR.2.1 TDD |
| CSI-RS for tracking | Config 1 |  | TRS.1.1 FDD | TRS.1.1 FDD |
|  | Config 2 |  | TRS.1.1 TDD | TRS.1.1 TDD |
|  | Config 3 |  | TRS.1.1 TDD | TRS.1.1 FDD |
|  | Confiq 4 |  | TRS.1.1 FDD | TRS.1.1 TDD |
|  | Confiq 5 |  | TRS.1.2 TDD | TRS.1.2 TDD |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | CR.1.1 FDD |
| Config 2 | CR.1.1 TDD | CR.1.1 TDD |
| Config 3 | CR.1.1 TDD | CR.1.1 FDD |
| Confiq 4 | CR.1.1 FDD | CR.1.1 TDD |
| Confiq 5 | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | CCR.1.1 FDD |
| Config 2 | CCR.1.1 TDD | CCR.1.1 TDD |
| Config 3 | CCR.1.1 TDD | CCR.1.1 FDD |
| Config 4 | CCR.1.1 FDD | CCR.1.1 TDD |
| Config 5 | CCR.2.1 TDD | CCR.2.1 TDD |
| OCNG Patterns | Config 1,2,3,4 |  | OP.1Note 7 | OP.1 Note 7 |
| Config 5 |  | OP.1 Note 8 | OP.1 Note 8 |
| SMTC Configuration | |  | SMTC.1 | SMTC.4 |
| SSB Configuration | Config 1,2,3,4 |  | SSB.1 FR1 | SSB.5 FR1 |
| Config 5 | SSB.2 FR1 | SSB.6 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | 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 | | dBm/15 kHz | -104 | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | -87 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| NocNote 2 | Config 1,2,3,4 | dBm/SCS | -104 | -104 |
| Config 5 | -101 | -101 |
| IoNote3 | Config 1,2,3,4 | dBm/  9.36MHz | -58.96 | -58.96 |
| Config 5 | dBm/  38.16MHz | -52.86 | -52.86 |
| Time offset to Cell1 Note 5 | | μs | - | 3 |
| Propagation Condition | |  | AWGN | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled within BWoccupied.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.  Note 4: Void  Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 6: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of TS 38.213 [3].  Note 7: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 8: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 9: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | |

A.6.5.2.1.2 Test Requirements

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-2.

Table A.6.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

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

Table A.6.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

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

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

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

A.6.5.3 SCell Activation and Deactivation Delay

#### A.6.5.3.1 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 160ms SCell measurement cycle

##### A.6.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.1.1-1 below. The test parameters are given in Tables A.6.5.3.1.1-2 and cell-specific parameters in A.6.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

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

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

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3, and The starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.

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.

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.6.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

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

Table A.6.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every four slots |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| TCSI\_Reporting | ms |  | The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]  is the subcarrier spacing configuration for DL |

Table A.6.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | T1 | | | T2 | | T3 | | |
| Cell 1 | Cell 2 | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | |
| Duplex mode | | Config 1 | |  | FDD | | | | | | | |
| Config 2,3 | | TDD | | | | | | | |
| TDD configuration | | Config 1 | |  | Not applicable | | | | | | | |
| Config 2 | | TDDConf.1.1 | | | | | | | |
| Config 3 | | TDDConf.2.1 | | | | | | | |
| BWchannel | | Config 1,2 | | MHz | Note 7 | | | | | | | |
| Config 3 | | Note 7 | | | | | | | |
| BWoccupied | | Config 1,2 | | RB | 52 Note 5 | | | | | | | |
| Config 3 | | 106 Note 6 | | | | | | | |
| Initial BWP configuration | | | |  | DLBWP.0.2 | | | | | | | |
| TCI state | | | |  | TCI.State.0 | | | | | | | |
| TRS Configuration | | | |  | TRS.1.1 TDD | | | | | | | |
| PDSCH Reference measurement channel | | Config 1 | |  | SR.1.1 FDD | | - | SR.1.1 FDD | - | SR.1.1 FDD | | - |
| Config 2 | | SR.1.1 TDD | | SR.1.1 TDD | SR.1.1 TDD | |
| Config 3 | | SR2.1 TDD | | SR2.1 TDD | SR2.1 TDD | |
| Dedicated CORESET parameters | | Config 1 | |  | CCR.1.1 FDD | | - | CCR.1.1 FDD | - | CCR.1.1 FDD | | - |
| Config 2 | | CCR.1.1 TDD | | CCR.1.1 TDD | CCR.1.1 TDD | |
| Config 3 | | CCR2.1 TDD | | CCR2.1 TDD | CCR2.1 TDD | |
| RMSI CORESET parameters | | Config 1 | |  | CR.1.1 FDD | | - | CR.1.1 FDD | - | CR.1.1 FDD | | - |
| Config 2 | | CR.1.1 TDD | | CR.1.1 TDD | CR.1.1 TDD | |
| Config 3 | | CR2.3 TDD | | CR2.3 TDD | CR2.3 TDD | |
| OCNG Patterns | Config 1,2 | | |  | OP.1Note 5 | | | | | | | |
| Config 3, | | |  | OP.1 Note 6 | | | | | | | |
| SSB Configuration | Config 1,2 | | |  | SSB.1 FR1 | | | | | | | |
| Config 3 | | | SSB.2 FR1 | | | | | | | |
| CSI-RS configuration for CSI reporting | Config 1 | | |  | CSI-RS.1.1 FDD | | | | | | | |
| Config 2 | | |  | CSI-RS.1.1 TDD | | | | | | | |
| Config 3 | | |  | CSI-RS.2.1 TDD | | | | | | | |
| SMTC configuration | | | |  | SMTC.1 | | | | | | | |
| CSI reporting periodicity | | | | ms | 5 | | | | | | | |
| EPRE ratio of PSS to SSS | | | | dB | 0 | | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | |
| EPRE ratio of PDSCH to PDSCH | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |
| Note2 | | | Config 1,2,4,5 | dBm/15kHz | -104 | | | | | | | |
| Config 3,6 | -101 | | | | | | | |
|  | | | | dB | 17 | | | | | | | |
|  | | | | dB | 17 | | | | | | | |
| SS-RSRPNote3 | | | Config 1,2,4,5 | dBm/SCS | -87 | | | | | | | |
| Config 3,6 | -84 | | | | | | | |
| SCH\_RP Note 3 | | | | dBm/15 kHz | -87 | | | | | | | |
| Io Note3 | Config 1,2,4,5 | | | dBm/  9.36MHz | -58.96 | | | | | | | |
| Config 3,6 | | | dBm/  38.16MHz | -52.87 | | | | | | | |
| Propagation condition | | | | - | AWGN | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled within BWoccupied.  Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | | | | | | | | | |

##### A.6.5.3.1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption.During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot , Tactivation\_time = TFirstSSB+ 5ms, as defined in clause 8.3.

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

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.

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

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

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

#### A.6.5.3.2 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 320ms SCell measurement cycle

##### A.6.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1. The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-1.

Table A.6.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320ms SCell measurement cycle

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

##### A.6.5.3.2.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstSSB\_MAX + Trs + 5ms.

#### A.6.5.3.3 SCell Activation and deactivation of unknown SCell in FR1 in non-DRX

##### A.6.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.6.5.3.1.1-1. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

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

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

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3, and the starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.

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.

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.6.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| T1 | ms | 100 | During this time the PSCell shall be known and the SCell configured, but not detected. |

##### A.6.5.3.3.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstSSB\_MAX + TSMTC\_MAX + 2\*Trs + 5ms as defined in clause 8.3.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

A.6.5.4 UE UL carrier RRC reconfiguration Delay

#### A.6.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.6.5.4.1-1 - Table A.6.5.4.1-4 : Void

##### A.6.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are two cells: FR1 PCell (cell 1) and FR1 SCell (cell 2). Both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB.* The test parameters for PCell and SCell are given in Table A. 6.5.4.1.1-1, Table A.6.5.4.1.1-2, Table A.6.5.4.1.1-3 and Table A.6.5.4.1.1-4 below. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 2 is configured to UE*.* At the start of T2, a supplementary uplink of cell 2 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 2 is configured to UE*.* At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.6.5.4.1.1-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| **Configuration** | **PCell (Cell 1)** | **SCell (Cell 2)** |
| 1 | 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode | DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode;  SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 2 | 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode | DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode;  SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 3 | 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode | DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode;  SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode |
| 4 | 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode | DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode;  SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 5 | 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode | DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode;  SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 6 | 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode | DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode;  SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode |
| 7 | 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode | DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode;  SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 8 | 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode | DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode;  SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode |
| 9 | 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode | DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode;  SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration, | | |

Table A.6.5.4.1.1-2: General test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on Pcell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| RF Channel Number |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 1, 2 | Two radio channels are used for these two tests. |
| Active cell |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | Cell 1: FR1 PCell  Cell 2: FR1 SCell | PCell on RF channel number 1  FR1 SCell on RF channel number 2 |
| CP length |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | Normal |  |
| DRX |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | OFF |  |
| Measurement gap pattern Id |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | OFF |  |
| Filter coefficient |  | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 0 | L3 filtering is not used |
| T1 | s | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 5 |  |
| T2 | s | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 5 |  |
| T3 | s | Config 1,2,3, 4, 5, 6, 7, 8, 9 | 5 |  |

Table A.6.5.4.1.1-3: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on PCell (Cell 1)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test Configuration** | **Test 1** | | | **Test 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Channel number |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 1 | | | 1 | | |
| TDD configuration |  | Conf 1, 2, 3 | N/A | | | N/A | | |
| Conf 4, 5, 6 | TDD Conf.1.1 | | | TDD Conf.1.1 | | |
| Conf 7, 8, 9 | TDD Conf.2.1 | | | TDD Conf.2.1 | | |
| BWchannel | MHz | Conf 1, 2, 3 | Note 6 | | | Note 6 | | |
| Conf 4, 5, 6 | Note 6 | | | Note 6 | | |
| Conf 7, 8, 9 | Note 6 | | | Note 6 | | |
| BWoccupied | RB | Conf 1, 2, 3 | 52 Note 4 | | | 52 Note 4 | | |
| Conf 4, 5, 6 | 52 Note 4 | | | 52 Note 4 | | |
| Conf 7, 8, 9 | 106 Note 5 | | | 106 Note 5 | | |
| PDSCH reference measurement channel as defined in A.3.1.1 |  | Conf 1, 2, 3 | SR.1.1 FDD | | | SR.1.1 FDD | | |
| Conf 4, 5, 6 | SR.1.1 TDD | | | SR.1.1 TDD | | |
| Conf 7, 8, 9 | SR 2.1 TDD | | | SR 2.1 TDD | | |
| RMSI CORESET reference measurement channel as defined in A.3.1.2 |  | Conf 1, 2, 3 | CR.1.1 FDD | | | CR.1.1 FDD | | |
| Conf 4, 5, 6 | CR.1.1 TDD | | | CR.1.1 TDD | | |
| Conf 7, 8, 9 | CR.2.1 TDD | | | CR.2.1 TDD | | |
| RMC CORESET reference measurement channel as defined in A.3.1.3 |  | Conf 1, 2, 3 | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| Conf 4, 5, 6 | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
| Conf 7, 8, 9 | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| OCNG Pattern Note 1 |  | Conf 1, 2, 3, 4, 5, 6 | OP.1 Note 4 | | | OP.1 Note 4 | | |
|  | Config 7, 8, 9 | OP.1 Note 5 | | | OP.1 Note 5 | | |
| SSB configuration |  | Conf 1, 2, 3, 4, 5, 6 | SSB.1 FR1 | | | SSB.1 FR1 | | |
| Conf 7, 8, 9 | SSB.2 FR1 | | | SSB.2 FR1 | | |
| SMTC configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | SMTC.1 | | | SMTC.1 | | |
| CSI-RS for tracking |  | Conf 1 | TRS.1.1 FDD | | | TRS.1.1 FDD | | |
|  | Conf 2 | TRS.1.1 FDD | | | TRS.1.1 FDD | | |
|  | Conf 3 | TRS.1.1 FDD | | | TRS.1.1 FDD | | |
|  | Conf 4 | TRS.1.1 TDD | | | TRS.1.1 TDD | | |
|  | Conf 5 | TRS.1.1 TDD | | | TRS.1.1 TDD | | |
|  | Conf 6 | TRS.1.1 TDD | | | TRS.1.1 TDD | | |
|  | Conf 7 | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
|  | Conf 8 | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
|  | Conf 9 | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| DL initial BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| DL dedicated BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | DLBWP.1.1 | | | DLBWP.1.1 | | |
| UL dedicated BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | ULBWP.1.1 | | | ULBWP.1.1 | | |
| EPRE ratio of PSS to SSS | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 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 SSS |
| EPRE ratio of OCNG to OCNG DMRS |
| Note 2 | dBm / 15kHz | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | -102 | | | -102 | | |
| dBm/ SCS | Conf 1,2,3,4,5,6 | -102 | | | -102 | | |
| Conf 7,8,9 | -99 | | | -99 | | |
|  | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 16 | 16 | 16 | 16 | 16 | 16 |
| Note 3 | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 16 | 16 | 16 | 16 | 16 | 16 |
| SS-RSRP Note 3 | dBm/ SCS | Conf 1,2,3,4,5,6 | -86 | -86 | -86 | -86 | -86 | -86 |
| Conf 7,8,9 | -83 | -83 | -83 | -83 | -83 | -83 |
| Io Note 3 | dBm/ 9.36 MHz | Conf 1,2,3,4,5,6 | -57.9 | -57.9 | -57.9 | -57.9 | -57.9 | -57.9 |
| dBm/ 38.16MHz | Conf 7,8,9 | -51.8 | -51.8 | -51.8 | -51.8 | -51.8 | -51.8 |
| Propagation Condition |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | AWGN | | | AWGN | | |
| Antenna configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 1 x 2 | | | 1 x 2 | | |
| NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled within BWoccupied.  NOTE 3: , Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  NOTE 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | | | | | |

Table A.6.5.4.1.1-4: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on SCell (Cell 2)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test Configuration** | **Test 1** | | | | **Test 2** | | |
| **T1** | **T2** | | **T3** | **T1** | **T2** | **T3** |
| Channel number |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 2 | | | | 2 | | |
| TDD configuration |  | Conf 1, 4, 7 | N/A | | | | N/A | | |
| Conf 2, 5, 8 | TDDConf.1.1 | | | | TDDConf.1.1 | | |
| Conf 3, 6, 9 | TDDConf.2.1 | | | | TDDConf.2.1 | | |
| BWchannel | MHz | Conf 1, 4, 7 | Note 6 | | | | Note 6 | | |
| Conf 2, 5, 8 | Note 6 | | | | Note 6 | | |
| Conf 3, 6, 9 | Note 6 | | | | Note 6 | | |
| BWoccupied | RB | Conf 1, 4, 7 | 52 Note 4 | | | | 52 Note 4 | | |
| Conf 2, 5, 8 | 52 Note 4 | | | | 52 Note 4 | | |
| Conf 3, 6, 9 | 106 Note 5 | | | | 106 Note 5 | | |
| PUSCH parameters for NR UL carrier |  | Conf 1, 4, 7 | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | | N/A | G-FR1-A3-10 in [13] | N/A |
| Conf 2, 5, 8 | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | | N/A | G-FR1-A3-10 in [13] | N/A |
| Conf 3, 6, 9 | G-FR1-A3-14 in [13] | G-FR1-A3-14 in [13] | G-FR1-A3-14 in [13] | | N/A | G-FR1-A3-14 in [13] | N/A |
| PUCCH parameters  For NR UL carrier |  | Conf 1, 4, 7 | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | | N/A | N/A | N/A |
| Conf 2, 5, 8 | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | | N/A | N/A | N/A |
| Conf 3, 6, 9 | Table 8.3.3.1.2-2 in [13] | Table 8.3.3.1.2-2 in [13] | Table 8.3.3.1.2-2 in [13] | | N/A | N/A | N/A |
| PUSCH parameters for supplementary UL |  | Conf 1, 4, 7 | N/A | G-FR1-A3-10 in [13] | N/A | | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] |
| Conf 2, 5, 8 | N/A | G-FR1-A3-10 in [13] | N/A | | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] | G-FR1-A3-10 in [13] |
| Conf 3, 6, 9 | N/A | G-FR1-A3-14 in [13] | N/A | | G-FR1-A3-14 in [13] | G-FR1-A3-14 in [13] | G-FR1-A3-14 in [13] |
| PUCCH parameters for supplementary UL |  | Conf 1, 4, 7 | N/A | N/A | N/A | | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] |
| Conf 2, 5, 8 | N/A | N/A | N/A | | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] | Table 8.3.3.1.2-1 in [13] |
| Conf 3, 6, 9 | N/A | N/A | N/A | | Table 8.3.3.1.2-2 in [13] | Table 8.3.3.1.2-2 in [13] | Table 8.3.3.1.2-2 in [13] |
| PDSCH reference measurement channel as defined in A.3.1.1 |  | Conf 1, 4, 7 | SR.1.1 FDD | | | | SR.1.1 FDD | | |
| Conf 2, 5, 8 | SR.1.1 TDD | | | | SR.1.1 TDD | | |
| Conf 3, 6, 9 | SR 2.1 TDD | | | | SR 2.1 TDD | | |
| RMSI CORESET reference measurement channel as defined in A.3.1.2 |  | Conf 1, 4, 7 | CR.1.1 FDD | | | | CR.1.1 FDD | | |
| Conf 2, 5, 8 | CR.1.1 TDD | | | | CR.1.1 TDD | | |
| Conf 3, 6, 9 | CR.2.1 TDD | | | | CR.2.1 TDD | | |
| RMC CORESET reference measurement channel as defined in A.3.1.3 |  | Conf 1, 4, 7 | CCR.1.1 FDD | | | | CCR.1.1 FDD | | |
| Conf 2, 5, 8 | CCR.1.1 TDD | | | | CCR.1.1 TDD | | |
| Conf 3, 6, 9 | CCR.2.1 TDD | | | | CCR.2.1 TDD | | |
| OCNG Pattern Note 1 |  | Conf 1, 2, 4, 5, 7, 8 | OP.1 Note 4 | | | | OP.1 Note 4 | | |
|  | Conf 3, 6, 9 | OP.1 Note 5 | | | | OP.1 Note 5 | | |
| SSB configuration |  | Conf 1, 2, 4, 5, 7,8 | SSB.1 FR1 | | | | SSB.1 FR1 | | |
| Conf 3, 6, 9 | SSB.2 FR1 | | | | SSB.2 FR1 | | |
| SMTC configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | SMTC.1 | | | | SMTC.1 | | |
| CSI-RS for tracking |  |  | Conf 1 | | | | TRS.1.1 FDD | | |
|  |  |  | Conf 2 | | | | TRS.1.1 TDD | | |
|  |  |  | Conf 3 | | | | TRS.1.2 TDD | | |
|  |  |  | Conf 4 | | | | TRS.1.1 FDD | | |
|  |  |  | Conf 5 | | | | TRS.1.1 TDD | | |
|  |  |  | Conf 6 | | | | TRS.1.2 TDD | | |
|  |  |  | Conf 7 | | | | TRS.1.1 FDD | | |
|  |  |  | Conf 8 | | | | TRS.1.1 TDD | | |
|  |  |  | Conf 9 | | | | TRS.1.2 TDD | | |
| DL initial BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | DLBWP.0.1 | | | | DLBWP.0.1 | | |
| DL dedicated BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | DLBWP.1.1 | | | | DLBWP.1.1 | | |
| UL dedicated BWP configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | ULBWP.1.1 | | | | ULBWP.1.1 | | |
| EPRE ratio of PSS to SSS | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 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 SSS |
| EPRE ratio of OCNG to OCNG DMRS |
| Note 2 | dBm / 15kHz | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | -102 | | | | -102 | | |
| dBm/ SCS | Conf 1, 2, 4, 5, 7,8 | -102 | | | | -102 | | |
| Conf 3, 6, 9 | -99 | | | | -99 | | |
|  | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 16 | 16 | | 16 | 16 | 16 | 16 |
| Note 3 | dB | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 16 | 16 | | 16 | 16 | 16 | 16 |
| SS-RSRP Note 3 | dBm/ SCS | Conf 1, 2, 4, 5, 7,8 | -86 | -86 | | -86 | -86 | -86 | -86 |
| Conf 3, 6, 9 | -83 | -83 | | -83 | -83 | -83 | -83 |
| Io Note 3 | dBm/ 9.36 MHz | Conf 1, 2, 4, 5, 7,8 | -57.9 | -57.9 | | -57.9 | -57.9 | -57.9 | -57.9 |
| dBm/ 38.16MHz | Conf 3, 6, 9 | -51.8 | -51.8 | | -51.8 | -51.8 | -51.8 | -51.8 |
| Propagation Condition |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | AWGN | | | | AWGN | | |
| Antenna configuration |  | Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 | 1 x 2 | | | | 1 x 2 | | |
| NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled within BWoccupied.  NOTE 3: , Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  NOTE 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | | | | | | |

##### A.6.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

A.6.5.6 Active BWP switch

#### A.6.5.6.1 DCI-based and Timer-based Active BWP Switch

##### A.6.5.6.1.1 NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA

A.6.5.6.1.1.1 Test Purpose and Environment

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

The supported test configurations are shown in Table A.6.5.6.1.1.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one SCell (Cell 2) as given in Table A.6.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.6.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on 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.6.5.6.1.1.1-1: DL BWP switch supported test configurations**

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

**Table A.6.5.6.1.1.1-2: General test parameters for DL BWP switch in SA**

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

**Table A.6.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell2** |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1 |  | FDD | FDD |
|  | Config 2,5 |  | TDD | TDD |
|  | Config 3 |  | TDD | FDD |
|  | Config 4 |  | FDD | TDD |
| TDD configuration | Config 1 |  | Not Applicable | Not Applicable |
|  | Config 2 |  | TDDConf.1.1 | TDDConf.1.1 |
|  | Config 3 |  | TDDConf.1.1 | Not Applicable |
|  | Config 4 |  | Not Applicable | TDDConf.1.1 |
|  | Config 5 |  | TDDConf.1.2 | TDDConf.1.2 |
| BWchannel | Config 1,2,3,4 |  | Note 7 | Note 7 |
|  | Config 5 |  | Note 7 | Note 7 |
| BWoccupied | Config 1,2,3,4 | RB | 52 Note 5 | 52 Note 5 |
| Config 5 | 106 Note 6 | 106 Note 6 |
| Active BWP ID | |  | 1, 2 | 3 |
| 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 | Config 1 |  | SR.1.1 FDD | SR.1.1 FDD |
| measurement channel | Config 2 |  | SR.1.1 TDD | SR.1.1 TDD |
|  | Config 3 |  | SR.1.1 TDD | SR.1.1 FDD |
|  | Config 4 |  | SR.1.1 FDD | SR.1.1 TDD |
|  | Config 5 |  | SR.2.1 TDD | SR.2.1 TDD |
| RMSI CORESET | Config 1 |  | CR.1.1 FDD | CR.1.1 FDD |
| parameters | Config 2 |  | CR.1.1 TDD | CR.1.1 TDD |
|  | Config 3 |  | CR.1.1 TDD | CR.1.1 FDD |
|  | Config 4 |  | CR.1.1 FDD | CR.1.1 TDD |
|  | Config 5 |  | CR.2.1 TDD | CR.2.1 TDD |
| Dedicated CORESET | Config 1 |  | CCR.1.1 FDD | CCR.1.1 FDD |
| parameters | Config 2 |  | CCR.1.1 TDD | CCR.1.1 TDD |
|  | Config 3 |  | CCR.1.1 TDD | CCR.1.1 FDD |
|  | Config 4 |  | CCR.1.1 FDD | CCR.1.1 TDD |
|  | Config 5 |  | CCR.2.3 TDD | CCR.2.3 TDD |
| OCNG Patterns | Config 1,2,3,4 |  | OP.1 Note 5 | |
| Config 5 |  | OP.1 Note 6 | |
| SSB Configuration | Config 1,2,3,4 |  | SSB.1 FR1 | |
|  | Config 5 |  | SSB.2 FR1 | |
| SMTC Configuration | |  | SMTC.1 | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  |
| NocNote 2 | Config 1,2,3,4 | dBm/SCS | -104 | -104 |
|  | Config 5 |  | -101 | -101 |
| NocNote 2 | | dBm/15KHz | -104 | -104 |
| SS-RSRP Note 3 | Config 1,2,3,4 | dBm/SCS | -87 | -87 |
|  | Config 5 |  | -84 | -84 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| IoNote3 | Config 1,2,3,4 | dBm/  9.36MHz | -58.96 | -58.96 |
|  | Config 5 | dBm/  38.16MHz | -52.86 | -52.86 |
| Propagation Condition | |  | AWGN | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled within BWoccupied.  Note 3 SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].  Note 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | |

A.6.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for 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 UL 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.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

**Table A.6.6.3.1.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in non-DRX with PCell in FR1**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Configuration** | **Cell 1** | |
|  | **T1** | **T2** |
| RF channel number | | |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode | | |  | 1, 2, 3 | FDD | |
| 4, 5, 6 | TDD | |
| TDD Configuration | | SCS=15 KHz |  | 2, 5 | TDDConf.1.1 | |
| SCS=30 KHz |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | | | MHz | 1, 4 | 10: NRB,c = 52 (FDD) | |
| 2, 5 | 10: NRB,c = 52 (TDD) | |
| 3, 6 | 40: NRB,c = 106 (TDD) | |
| PDSCH reference measurement channel | | |  | 1, 4 | SR.1.1 FDD | |
| 2, 5 | SR.1.1 TDD | |
| 3, 6 | SR.2.1 TDD | |
| RMSI CORSET reference channel | | |  | 1, 4 | CR.1.1 FDD | |
| 2, 5 | CR.1.1 TDD | |
| 3, 6 | CR.2.1 TDD | |
| Dedicated CORSET reference channel | | |  | 1, 4 | CCR.1.1 FDD | |
|  | | |  | 2, 5 | CCR.1.1 TDD | |
|  | | |  | 3, 6 | CCR.2.1 TDD | |
| BWP configurations | Initial DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | |
| Dedicated DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | |
| Initial UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | |
| Dedicated UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | |
| OCNG patternNote1 | | |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration | | |  | 1, 2, 3, 4, 5, 6 | SMTC.1 | |
| SSB configuration | | |  | 1, 2, 4, 5 | SSB.1 FR1 | |
| 3, 6 | SSB.2 FR1 | |
| CSI-RS for tracking | | |  | 1, 4 | TRS.1.1 FDD | |
|  | | |  | 2, 5 | TRS.1.1 TDD | |
|  | | |  | 3, 6 | TRS.1.2 TDD | |
| b2-Threshold1 | | | dBm | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| EPRE ratio of PSS to SSS | | | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH\_DMRS | | |
| EPRE ratio of PDCCH\_DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | |
| EPRE ratio of PDSCH\_DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | |
| EPRE ratio of OCNG DMRS to SSS | | |
| EPRE ratio of OCNG to OCNG DMRS | | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2, 3, 4, 5, 6 | -106 | |
| *Noc*Note2 | | | dBm/SCS | 1, 2, 4, 5 | -106 | |
| 3, 6 | -103 | |
| Ês/Noc | | | dB | 1, 2, 3, 4, 5, 6 | 18 | -2 |
| Ês/IotNote3 | | | dB | 1, 2, 3, 4, 5, 6 | 18 | -2 |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -108 |
|  | | | 3, 6 | -85 | -105 |
| SSB\_RPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -108 |
|  | | | 3, 6 | -85 | -105 |
| IoNote3 | | | dBm/9.36 MHz | 1, 2, 4, 5 | -59.98 | -75.92 |
| dBm/38.16 MHz | 3, 6 | -53.88 | -69.82 |
| Propagation condition | | |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: OCNG shall be used such that 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: Ês/Iot, SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

<<Unchanged sections skipped>>

**Table A.6.6.3.2.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Configuration** | **Cell 1** | |
|  | **T1** | **T2** |
| RF channel number | | |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode | | |  | 1, 2, 3 | FDD | |
| 4, 5, 6 | TDD | |
| TDD Configuration | | SCS=15 KHz |  | 2, 5 | TDDConf.1.1 | |
| SCS=30 KHz |  | 3, 6 | TDDConf.2.1 | |
| BWchannel | | | MHz | 1, 4 | 10: NRB,c = 52 (FDD) | |
| 2, 5 | 10: NRB,c = 52 (TDD) | |
| 3, 6 | 40: NRB,c = 106 (TDD) | |
| PDSCH reference measurement channel | | |  | 1, 4 | SR.1.1 FDD | |
| 2, 5 | SR.1.1 TDD | |
| 3, 6 | SR.2.1 TDD | |
| RMSI CORSET reference channel | | |  | 1, 4 | CR.1.1 FDD | |
| 2, 5 | CR.1.1 TDD | |
| 3, 6 | CR.2.1 TDD | |
| Dedicated CORSET reference channel | | |  | 1, 4 | CCR.1.1 FDD | |
|  | | |  | 2, 5 | CCR.1.1 TDD | |
|  | | |  | 3, 6 | CCR.2.1 TDD | |
| BWP configurations | Initial DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | |
| Dedicated DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | |
| Initial UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | |
| Dedicated UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | |
| OCNG patternNote1 | | |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration | | |  | 1, 2, 3, 4, 5, 6 | SMTC.1 | |
| SSB configuration | | |  | 1, 2, 4, 5 | SSB.1 FR1 | |
| 3, 6 | SSB.2 FR1 | |
| CSI-RS for tracking | | |  | 1, 4 | TRS.1.1 FDD | |
|  | | |  | 2, 5 | TRS.1.1 TDD | |
|  | | |  | 3, 6 | TRS.1.2 TDD | |
| b2-Threshold1 | | | dBm | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| EPRE ratio of PSS to SSS | | | dB | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH\_DMRS | | |
| EPRE ratio of PDCCH\_DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | |
| EPRE ratio of PDSCH\_DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | |
| EPRE ratio of OCNG DMRS to SSS | | |
| EPRE ratio of OCNG to OCNG DMRS | | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2, 3, 4, 5, 6 | -106 | |
| *Noc*Note2 | | | dBm/SCS | 1, 2, 4, 5 | -106 | |
| 3, 6 | -103 | |
| Ês/Noc | | | dB | 1, 2, 3, 4, 5, 6 | 18 | -2 |
| Ês/IotNote3 | | | dB | 1, 2, 3, 4, 5, 6 | 18 | -2 |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -108 |
|  | | | 3, 6 | -85 | -105 |
| SSB\_RPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | -108 |
|  | | | 3, 6 | -85 | -105 |
| IoNote3 | | | dBm/9.36 MHz | 1, 2, 4, 5 | -59.98 | -75.92 |
| dBm/38.16 MHz | 3, 6 | -53.88 | -69.82 |
| Propagation condition | | |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: OCNG shall be used such that 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: Ês/Iot, SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

## A.7.1 SA: RRC\_IDLE state mobility

A.7.1.1 Cell re-selection to NR

#### A.7.1.1.1 Cell reselection to FR2 intra-frequency NR case

##### A.7.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

##### A.7.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.1.2-1, A.7.1.1.1.2-2 and A.7.1.1.1.2-3. 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.7.1.1.1.2-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

**Table A.7.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Value** | **Comment** |
| Initial condition | Active cell |  | 1, 2 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2 | Cell2 |  |
| Neighbour cells |  | 1, 2 | Cell1 |  |
| Final condition | Active cell |  | 1, 2 | Cell1 |  |
| Neighbour cell |  | 1, 2 | Cell2 |  |
| RF Channel Number | |  | 1, 2 | 1 |  |
| Time offset between cells | |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2 | Not configured |  |
| T1 | | s | 1, 2 | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 1, 2 | 135 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2 | 35 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

**Table A.7.1.1.1.2-3: Cell specific test parameters for intra 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, 2 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC |  | 1 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| configuration |  | 2 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| RMC configuration |  | 2 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| RMC configuration |  | 2 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| SSB configuration |  | 1 | SSB.3 FR2 | | | SSB.7 FR2 | | |
|  |  | 2 | SSB.4 FR2 | | | SSB.8 FR2 | | |
| OCNG Pattern |  | 1, 2 | OP.4 | | | OP.4 | | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1, 2 | 66 | | | 66 | | |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -138 | | | -138 | | |
|  |  | 2 | -135 | | | -135 | | |
| Pcompensation | dB | 1, 2 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | | | SS-RSRP | | |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | | Rough | | |
|  | dB | 1 | 8 | -3 | 1.5 | -infinity | 1.5 | -3 |
|  |  | 2 |
| Note2 | dBm/SCS | 1 | -93 | | | | | |
|  |  | 2 | -90 | | | | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | | | |
|  |  | 2 |  | | | | | |
|  | dB | 1 | 8 | -3 | 1.5 | -infinity | 1.5 | -3 |
|  |  | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -85 | -96 | -91.5 | -infinity | -91.5 | -96 |
|  |  | 2 | -82 | -93 | -88.5 | -infinity | -88.5 | -93 |
| Io on SSB symbols of each cell | dBm/95.04 MHz | 1 | -59.37 | -63.40 | -62.47 | -64.01 | -62.47 | -63.40 |
| 2 | -57.18 | -62.86 | -61.67 | -64.01 | -61.67 | -62.86 |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2 | 50 | | | 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.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

##### A.7.1.1.1.3 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 Registration procedure for mobility and periodic registration update on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 130 s.

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 Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to an already detected cell shall be less than 27 s.

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 + TSI-NR, and to an already detected cell can be expressed as: Tevaluate, NR\_ intra + TSI-NR,

Where:

Tdetect, NR\_Intra See Table 4.2.2.3-1 in clause 4.2.2.3

Tevaluate, NR\_ intra See Table 4.2.2.3-1 in clause 4.2.2.3

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 129.28 s, allow 130 s for the cell re-selection delay to a newly detectable cell and 26.88 s for the cell re-selection delay to an already detected cell in the test case, which we allow 27 s.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

### A.7.3.1 Handover

#### A.7.3.1.1 Inter-frequency handover from FR1 to FR2; unknown target cell

##### A.7.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR2 inter frequency handover requirements specified in clause 6.1.1.5.

##### A.7.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.1.2-2, and A.7.3.1.1.2-3.

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.7.3.1.1.2-1: Inter-frequency handover from FR1 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.1.2-2: General test parameters Inter-frequency handover from FR1 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Offset | | dBm | -120 |  |
| 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 | ≤10 |  |

Table A.7.3.1.1.2-3: Cell specific test parameters for NR FR1-FR2 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | | | |  | N/A | | | Rough | | |
| AoA setup | | | |  | NA | | | Setup 1  as defined in A.3.15 | | |
| NR RF Channel Number | | | |  | 1 | | | 2 | | |
| Duplex mode | | | Config 1 |  | FDD | | TDD | | | |
| Config 2,3 | TDD | | TDD | | | |
| TDD configuration | | | Config 1 |  | Not Applicable | | TDDConf.3.1 | | | |
| Config 2 | TDDConf.1.1 | | TDDConf.3.1 | | | |
| Config 3 | TDDConf.2.1 | | TDDConf.3.1 | | | |
| BWchannel | | | Config 1 | MHz | 10: NRB,c = 52 | | 100: NRB,c = 66 | | | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | | | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | | | |
| BWP BW | | | Config 1 | MHz | 10: NRB,c = 52 | | 100: NRB,c = 66 | | | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | | | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | | | |
| Data RBs allocated | | | Config 1 |  | 52 | | 66 | | | |
| Config 2 | 52 | | 66 | | | |
| Config 3 | 106 | | 66 | | | |
| DRx Cycle | | | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | | | Config 1 |  | SR.1.1 FDD | | SR.3.1 TDD | | | |
| Config 2 | SR.1.1 TDD | | SR.3.1 TDD | | | |
| Config 3 | SR2.1 TDD | | SR.3.1 TDD | | | |
| RMSI CORESET Reference Channel | | | Config 1 |  | CR.1.1 FDD | | CR.3.1 TDD | | | |
| Config 2 | CR.1.1 TDD | | CR.3.1 TDD | | | |
| Config 3 | CR2.1 TDD | | CR.3.1 TDD | | | |
| Control Channel RMC | | | Config 1 |  | CCR.1.1 FDD | | CCR.3.1 TDD | | | |
|  | | | Config 2 |  | CCR.1.1 TDD | | CCR.3.1 TDD | | | |
|  | | | Config 3 |  | CCR.2.1 TDD | | CCR.3.1 TDD | | | |
| OCNG Patterns | | | |  | OP.1 | | | | | |
| SSB configuration | | | Config 1,2 |  | SSB.1 FR1 | | SSB.3 FR2 | | | |
| Config 3 | SSB.2 FR1 | | SSB.3 FR2 | | | |
| SSB configuration | | | Config 1,2 |  | SSB.1 FR1 | | SSB.3 FR2 | | | |
| Config 3 | SSB.2 FR1 | | SSB.3 FR2 | | | |
| SMTC configuration | | | Config 1,2 |  | SMTC.1 | | SMTC.1 | | | |
| Config 3 | SMTC.2 | | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | | | Config 1,2 | kHz | 15 kHz | | 120 kHz | | | |
| Config 3 | 30 kHz | | 120 kHz | | | |
| PUCCH/PUSCH subcarrier spacing | | | Config 1,2 | kHz | 15 kHz | | 120 kHz | | | |
| Config 3 | 30 kHz | | 120 kHz | | | |
| PRACH configuration | | | |  | FR1 PRACH configuration 1 | | FR2 PRACH configuration 1 | | | |
| TRS configuration | | Config 1 | |  | TRS.1.1 FDD | | TRS.2.1 TDD | | | |
| Config 2 | | TRS.1.1 TDD | | TRS.2.1 TDD | | | |
| Config 3 | | TRS.1.2 TDD | | TRS.2.1 TDD | | | |
| PDSCH/PDCCH TCI state | | | |  | N/A | | TCI.State.2 | | | |
| BWP configuraiton | | | Initial DL BWP |  | DLBWP.0.1 | | DLBWP.0.1 | | | |
| Dedicated DL BWP |  | DLBWP.1.1 | | DLBWP.1.1 | | | |
| Initial UL BWP |  | ULBWP.0.1 | | ULBWP.0.1 | | | |
| Dedicated UL BWP |  | ULBWP.1.1 | | ULBWP.1.1 | | | |
| 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) | | | |
| Note2 | | | | dBm/15kHz | Link only, see clause A.3.7A | | -104.7 | | | |
| Note2 | Config 1,2 | | | dBm/SCS | -95.7 | | | |
| Config 3 | | | -95.7 | | | |
|  | | | | dB | -Infinity | | 10 | |
|  | | | | dB | -Infinity | | 10 | |
| IoNote3 | Config 1,2 | | | dBm/  BW | -66.7 | | -56.3 | |
| Config 3 | | | dBm/  BW | -66.7 | | -56.3 | |
| Propagation condition | | | | - | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | | |

##### A.7.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 572 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 = 562 ms in the test. Tinterrupt is defined in clause 6.1.1.5.2.

This gives a total of 572 ms.

#### A.7.3.1.2 Intra-frequency handover from FR2 to FR2; unknown target cell

##### A.7.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.2.2-2, and A.7.3.1.2.2-3.

The test scenario comprises of 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.7.3.1.2.2-1: Intra-frequency handover from FR2 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.1.2.2-2: General test parameters Intra-frequency handover from FR2 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Offset | | dBm | -120 |  |
| 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 | ≤10 |  |

Table A.7.3.1.2.2-3: Cell specific test parameters for NR FR2-FR2 Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | | Cell 2 | | |
| T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | |  | Rough | | | | Rough | | |
| AoA setup | |  | Setup 1 as defined in A.3.15 | | | | | | |
| NR RF Channel Number | |  | 1 | | | | 1 | | |
| Duplex mode | |  | TDD | | | | | | |
| TDD configuration | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | MHz | 100: NRB,c = 66 | | | | | | |
| Data RBs allocated | |  | 66 | | | | | | |
| DRx Cycle | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD | | | | | | |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | | | | | | |
| Control Channel RMC | |  | CCR.3.1 TDD | | | | | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SMTC Configuration | |  | SMTC pattern 1 | | | | | | |
| SSB Configuration | |  | SSB.3 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 120 kHz | | | | | | |
| PRACH configuration | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | |  | TRS.2.1 TDD | | | | | | |
| PDSCH/PDCCH TCI state | |  | TCI.State.2 | | | | | | |
| BWP configuraiton | 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 | | | 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 | -104.7 | | | | | | |
| Note2 | | dBm/SCS | -95.7 | | | | | | |
|  | | dB | 6 | -1.8 | | -Infinity | | 0 | |
|  | | dB | 6 | 6 | | -Infinity | | 7 | |
| IoNote3 | | dBm/  BW | -59.7 | -56.7 | | -59.7 | | -56.7 | |
| Propagation condition | | - | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | |

##### A.7.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 232 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 = 222 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 232 ms.

#### A.7.3.1.3 Inter-frequency handover from FR2 to FR2; unknown target cell

##### A.7.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 inter frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.3.2-2, and A.7.3.1.3.2-3.

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.7.3.1.3.2-1: Inter-frequency handover from FR2 to FR2 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.1.3.2-2: General test parameters Inter-frequency handover from FR2 to FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A4-Offset | | dB | -120 |  |
| 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 | ≤10 |  |

Table A.7.3.1.3.2-3: Cell specific test parameters for NR FR2-FR2 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | | Cell 2 | | |
| T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | |  | Rough | | | | Rough | | |
| AoA setup | |  | Setup 1 as defined in A.3.15 | | | | | | |
| NR RF Channel Number | |  | 1 | | | | 2 | | |
| Duplex mode | |  | TDD | | | | | | |
| TDD configuration | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | MHz | 100: NRB,c = 66 | | | | | | |
| Data RBs allocated | |  | 66 | | | | | | |
| DRx Cycle | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD | | | | | | |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | | | | | | |
| Control Channel RMC | |  | CCR.3.1 TDD | | | | | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SMTC Configuration | |  | SMTC pattern 1 | | | | | | |
| SSB Configuration | |  | SSB.3 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 120 kHz | | | | | | |
| PRACH configuration | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | |  | TRS.2.1 TDD | | | | | | |
| PDSCH/PDCCH TCI state | |  | TCI.State.2 | | | | | | |
| BWP configuraiton | 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 | | | 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 | -104.7 | | | -104.7 | | | |
| Note2 | | dBm/SCS | -95.7 | | | -95.7 | | | |
|  | | dB | 5 | 5 | | -Infinity | | 5 | |
|  | | dB | 5 | 5 | | -Infinity | | 5 | |
| IoNote3 | | dBm/  BW | -60.5 | -60.5 | | -66.7 | | -60.5 | |
| Propagation condition | | - | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | |

##### A.7.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 552 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 = 542 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 552 ms.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

#### A.7.3.2.2 Random Access

##### A.7.3.2.2.1 Contention based random access test in FR2 for NR Standalone

A.7.3.2.2.1.1 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 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.1.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.1.1-2 and Table A.7.3.2.2.1.1-3.

**Table A.7.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2 for NR Standalone**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for NR Standalone**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test-1** | **Comments** |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | As defined in A.3.10 |
| CSI-RS for tracking | Config 1 |  | TRS.2.1 TDD |  |
| Duplex Mode for Cell 1 | Config 1 |  | TDD |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 | As defined in A.3.1.4 |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1 |  | 24 |  |
| OCNG Pattern Note 1 | |  | OP.3 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | SR.3.1 TDD | As defined in A.3.1.1. |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | As defined in A.3.1.2 |
| NR RF Channel Number | |  | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | dB |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | dB |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | dB |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | dB |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | dB |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | dB |  |
| *ss-PBCH-BlockPower* | | dBm/ SCS | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power () | | dBm | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| PRACH Configuration | |  | FR2 PRACH configuration 1 | As defined in A.3.8.3, with exceptions as defined below |
| *rsrp-ThresholdSSB* | | dBm | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| *preambleReceivedTargetPower* | | dBm | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: The ΔUL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | |

**Table A.7.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for NR Standalone**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test-1** | **Comments** |
| AoA setup | | |  | Setup 1 | As defined in A.3.15.1 |
| Assumption for UE beamsNote 3 | | |  | Rough |  |
| SSB with index 0 | Es Note1 | | dBm/SCS | -80.6 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
| SSB\_RP | | dBm/SCS | -80.6 |
| Es/IotBB | | dB | 21.09 |  |
| Io | | dBm/95.04 MHz | -56.01 | Io in symbols containing SSB index 0 |
| SSB with index 1 | | Es Note1 | dBm/SCS | -95.0 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
| SSB\_RP | dBm/SCS | -95.0 |
| Es/IotBB | dB | 6.69 |  |
| Io | dBm/95.04 MHz | -70.41 | Io in symbols containing SSB index 1 |
| Propagation Condition | | | - | AWGN |  |
| Note 1: No articial noise is applied in this test.  Note 2: Void.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.7.3.2.2.1.2 Test Requirements

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

A.7.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 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*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

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

A.7.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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.

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 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

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

A.7.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

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 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

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

A.7.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

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

A.7.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 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.7.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 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.7.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 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.7.3.2.2.2 Non-contention based random access test in FR2 for NR Standalone

A.7.3.2.2.2.1 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 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.2.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.2.1-2 and Table A.7.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

**Table A.7.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for NR Standalone**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test-1** | **Test-2** | **Comments** |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | SSB.1 FR2 | As defined in A.3.10 |
| CSI-RS for tracking | Config 1 |  | TRS.2.1 TDD | TRS.2.1 TDD |  |
| CSI-RS Configuration | Config 1 |  | N/A | CSI-RS.3.1 TDD | As defined in A.3.1.4 |
| Duplex Mode for Cell 1 | Config 1 |  | TDD | TDD |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 | TDDConf.3.1 |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 | 100: NRB,c =66 |  |
| Data RBs allocated | Config 1 |  | 24 | 24 |  |
| OCNG Pattern Note 1 | |  | OP.3 | OP.3 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | SR3.1 TDD | SR3.1 TDD | As defined in A.3.1.1. |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.3.1 TDD | CR.3.1 TDD |
| NR RF Channel Number | |  | 1 | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | dB |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | dB |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | dB |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | dB |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | dB |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | dB |  |
| *ss-PBCH-BlockPower* | | dBm/ SCS | +20 +ΔUL | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power () | | dBm | maximum value configurable for certain power class | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| PRACH Configuration | |  | FR2 PRACH configuration 2 | FR2 PRACH configuration 3 | As defined in A.3.8.3, with exceptions as defined below. |
| *rsrp-ThresholdSSB* | | dBm | RSRP\_69 +ΔDL | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| *preambleReceivedTargetPower* | | dBm | -100 | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: The ΔUL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | | |

**Table A.7.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for NR Standalone**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test-1** | **Test-2** | **Comments** |
| AoA setup | |  | Setup 1 | Setup 1 | As defined in A.3.15.1 |
| Assumption for UE beamsNote 3 | |  | Rough | Rough |  |
| SSB with index 0 | Es Note1 | dBm/SCS | -80.6 | -80.6 | Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB* |
| SSB\_RP | dBm/SCS | -80.6 | -80.6 |
| Es/IotBB | dB | 21.09 | 21.09 |  |
| Io | dBm/95.04 MHz | -56.01 | -56.01 | Io in symbols containing SSB index 0 |
| SSB with index 1 | Es Note1 | dBm/SCS | -95.0 | -95.0 | Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB* |
| SSB\_RP | dBm/SCS | -95.0 | -95.0 |
| Es/IotBB | dB | 6.69 | 6.69 |  |
| Io | dBm/95.04 MHz | -70.41 | -70.41 | Io in symbols containing SSB index 1 |
| Propagation Condition | | - | AWGN | AWGN |  |
| Note 1: No articial noise is applied in this test.  Note 2: void.  Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

A.7.3.2.2.2.2 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.7.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 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.

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 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

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

A.7.3.2.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble tranmsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occassions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

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

A.7.3.2.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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.

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 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

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

A.7.3.2.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

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 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

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

#### A.7.3.2.3 SA: RRC Connection Release with Redirection

##### A.7.3.2.3.1 Redirection from NR in FR2 to NR in FR2

A.7.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.7.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.7.3.2.3.1.2-2, and A.7.3.2.3.1.2-3.

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.7.3.2.3.1.2-1: Redirection from NR to NR test configurations

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode  Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| 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 | 3.2 |  |

**Table A.7.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | | | **Cell 2** | | |
| **T1** | | **T2** | | **T1** | | **T2** |
| Assumption for UE beamsNote 6 | |  | Rough | | | | Rough | | |
| AoA setup | |  | Setup 1 as defined in A.3.15 | | | | | | |
| NR RF Channel Number | |  | 1 | | | | 2 | | |
| Duplex mode | |  | TDD | | | | | | |
| TDD configuration | |  | TDDConf.3.1 | | | | | | |
| BWchannel | | MHz | 100: NRB,c = 66 | | | | | | |
| BWP BW | | MHz | 100: NRB,c = 66 | | | | | | |
| Data RBs allocated | |  | 66 | | | | | | |
| DRx Cycle | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD | | | | | | |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | | | | | | |
| Control Channel RMC | |  | CCR.3.1 TDD | | | | | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SMTC configuration | |  | SMTC.1 FR2 | | | | | | |
| SSB Configuration | |  | SSB.3 FR2 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 120 kHz | | | | | | |
| PRACH configuration | |  | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | |  | TRS.2.1 TDD | | | | | | |
| PDSCH/PDCCH TCI state | |  | TCI.State.2 | | | | | | |
| BWP configuraiton | 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 | | | 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 | -104.7 | | | -104.7 | | | |
| Note2 | | dBm/SCS | -95.7 | | | -95.7 | | | |
|  | | dB | 5 | 5 | | -Infinity | | 5 | |
|  | | dB | 5 | 5 | | -Infinity | | 5 | |
| IoNote3 | | dBm/  BW | -60.5 | -60.5 | | -66.7 | | -60.5 | |
| Propagation condition | | - | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zonee  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | | |

A.7.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 3160 ms from the beginning of time period T2.

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 = TRRC\_procedure\_delay + Tidentify-NR + TSI-NR + TRACH,

where:

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

Tidentify-NR = 1760 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.

T RACH = 10 ms in the test.

This gives a total of 3160 ms.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

A.7.5.2 Interruption

#### A.7.5.2.1 Interruptions during measurements on deactivated NR SCC in FR2

A.7.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.7.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.7.5.2.1.1-2 and A.7.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, PCell is continuously scheduled in DL.

Table A.7.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

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

Table A.7.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

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

Table A.7.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell1** | **Cell2** |
| Frequency Range | |  | FR2 | |
| Duplex mode |  |  | TDD | |
| TDD configuration |  |  | TDDConf.3.1 | |
| BWchannel |  |  | 100 MHz: NRB,c = 66 | |
| Data RBs allocated |  |  | 66 | |
| Initial DL BWP Configuration |  |  | DLBWP.0.2Note4 | |
| Initial UL BWP Configuration |  |  | ULBWP.0.2 Note6 | |
| Downlink dedicated BWP Configuration |  |  | DLBWP.1.1 | |
| Uplink dedicated BWP configuration |  |  | ULBWP.1.1 | |
| PDSCH Reference measurement channel |  |  | SR.3.1 TDD | |
| RMSI CORESET parameters |  |  | CR.3.1 TDD | |
| Dedicated CORESET parameters |  |  | CCR.3.1 TDD | |
| OCNG Patterns | |  | OP.1 | |
| SMTC Configuration | |  | SMTC.1 | |
| SSB Configuration |  |  | SSB.1 FR2 | |
| TCI State |  |  | TCI.State.0 | |
| TRS Configuration |  |  | TRS.2.1 TDD | |
| 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) | |
| Time offset to Cell1 Note 3 | | μs | - | 3 |
| 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: Void  Note 3: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of of TS 38.213 [3]. | | | | |

Table A.7.5.2.1.1-4: OTA related test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration | |  | Setup1 according to table A.3.15.1 | Setup 1according to table A.3.15.1 |
| Assumption for UE beams Note 6 | |  | Rough | Rough |
| Note1 | NR\_TDD\_FR2\_A | dBm/15kHz | -104.7 | -104.7 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| Note1 | NR\_TDD\_FR2\_A | dBm/SCS | -95.7 | -95.7 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| SS-RSRPNote2 | NR\_TDD\_FR2\_A | dBm/120KHz Note3 | -88.7 | -88.7 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
|  |  | dB | 7 | 7 |
|  | | dB | 7 | 7 |
| IoNote2 | NR\_TDD\_FR2\_A | dBm/95.04 MHz Note4 | -58.92 | -58.92 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

A.7.5.2.1.2 Test Requirements

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

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 4 slots before an SMTC and no later than 4 slots after the SMTC. the interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-2.

Table A.7.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

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

Table A.7.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

|  |  |  |
| --- | --- | --- |
|  | **NR Slot length (ms)** | **Interruption length**  **(slot)** |
| 3 | 0.125 | 4 + SMTC duration |

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

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

A.7.5.3 SCell Activation and Deactivation Delay

#### A.7.5.3.1 SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX

##### A.7.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except those described in Tables A.7.5.3.1.1-2, and cell specific test parameters are described in Tables A.7.5.3.1.1-3. OTA related test parameters are shown in table A.7.5.3.1.1-4 below.

Table A.7.5.3.1.1-1: Supported test configurations for FR2 SCell activation case

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

Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case

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

Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 5** | **Unit** | **T1** | | **T2** | | **T3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 66 | | 66 | | 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | |
| EPRE ratio of PSS to SSS | dB | 0 | | | | | |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | | |

Table A.7.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration |  | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -104.7 | | | -104.7 | | |
| Note1 | dBm/SCSNote3 | -95.7 | | | -95.7 | | |
|  | dB | 7 | | | 7 | | |
| SSB\_RPNote2 | dBm/SCS Note4 | -88.7 | | | -88.7 | | |
|  | dB | 7 | | | 7 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -58.92 | | | -58.92 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Void  Note 7: Implementation about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | |

##### A.7.5.3.1.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except Tactivation\_time will be replaced with the value TFirstSSB + 5ms as defined in clause 8.3.

#### A.7.5.3.2 SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2

##### A.7.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell is in FR1 and SCell is in FR2.

The supported test configurations are defined in Table A.7.5.3.2.1-1. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except that the length of T2 is 2s. And cell specific test parameters are described in Tables A.7.5.3.2.1-2. OTA related test parameters are defined in Table A.7.5.3.2.1-3.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

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

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

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

**Table A.7.5.3.2.1-1: Supported test configurations for FR2 SCell activation case**

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

**Table A.7.5.3.2.1-2: Cell specific test parameters for FR2 SCell activation case**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | T1 | | | | | | T2 | | | | T3 | | |
| Cell 1 | | | Cell 2 | | | Cell 1 | | Cell 2 | | Cell 1 | | Cell 2 |
| SSB ARFCN | |  | Freq1 | | Freq2 | | | | Freq1 | | Freq2 | | Freq1 | | Freq2 |
| Duplex mode | Config 1 |  | FDD | | | TDD | | | FDD | | TDD | | FDD | | TDD |
| Config 2,3 | TDD | | | | | | | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | TDDConf.3.1 | | | Not Applicable | | TDDConf.3.1 | | Not Applicable | | TDDConf.3.1 |
| Config 2,3 | TDDConf.1.1 | | | TDDConf.1.1 | | TDDConf.1.1 | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 |
| TRS configuration | Config 1,2,3 |  | N/A | | | | TRS.2.1 TDD | | N/A | | TRS.2.1 TDD | | N/A | | TRS.2.1 TDD |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | | TCI.State.0 |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | 100: NRB,c = 66 | | 10: NRB,c = 52 | | 100: NRB,c = 66 | | 10: NRB,c = 52 | | 100: NRB,c = 66 |
| Config 3 | 40: NRB,c = 106 | | | | 40: NRB,c = 106 | | 40: NRB,c = 106 | |
| Data RBs allocated | Config 1,2 |  | 52 | | | | 66 | | 52 | | 66 | | 52 | | 66 |
| Config 3 | 106 | | | | 106 | | 106 | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | - | | | SR.1.1 FDD | | - | | SR.1.1 FDD | | - |
| Config 2 | SR.1.1 TDD | | | SR.1.1 TDD | | SR.1.1 TDD | |
| Config 3 | SR.2.1 TDD | | | SR.2.1 TDD | | SR.2.1 TDD | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | - | | | CR.1.1 FDD | | - | | CR.1.1 FDD | | - |
| Config 2 | CR.1.1 TDD | | | CR.1.1 TDD | | CR.1.1 TDD | |
| Config 3 | CR.2.1 TDD | | | CR.2.1 TDD | | CR.2.1 TDD | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | - | | | CCR.1.1 FDD | | - | | CCR.1.1 FDD | | - |
| Config 2 | CCR.1.1 TDD | | | CCR.1.1 TDD | | CCR.1.1 TDD | |
| Config 3 | CCR.2.1 TDD | | | CCR.2.1 TDD | | CCR.2.1 TDD | |
| OCNG Patterns | |  | OP.1 | | | | | | | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | SSB.3 FR2 | | | SSB.1 FR1 | | SSB.3 FR2 | | SSB.1 FR1 | | SSB.3 FR2 |
| Config 3 | SSB.2 FR1 | | | SSB.2 FR1 | | SSB.2 FR1 | |
| CSI-RS configuration | Config 1~3 |  | NA | | | NA | | | NA | | CSI-RS.3.1 TDD Note 6 | | NA | | CSI-RS.3.1 TDD |
| CSI reporting periodicity Note 7 | Config 1~6 | ms | NA | | | 5 | | | NA | | 5 | | NA | | 5 |
| SMTC configuration | |  | SMTC.1 | | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | | | | | | | | |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Propagation conditions | |  | NA  Link only, see clause A.3.7A | AWGN | | | | NA  Link only, see clause A.3.7A | | AWGN | | NA  Link only, see clause A.3.7A | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: All parameters apply for configuration 1 and 2.  Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | | | | | | |



**Table A.7.5.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2 SCell**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | Cell 1 | | | Cell 2 | | | | |
| T1 | T2 | T3 | T1 | T2 | | T3 | |
| Angle of arrival configuration | |  | N/A | | | According to clause A.3.15.1 | | | | |
| Assumption for UE beams Note 7 | |  | N/A | | | Rough | | | | |
| Note 1 | Config 1,2,3 | dBm/15kHz | Link only, see clause A.3.7A | | | -104.7 | | | | |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | | | | |
|  | Config 1,2,3 | dB | -∞ | | 7 | | 7 |
|  | Config 1,2,3 | dB | -∞ | | 7 | | 7 |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -∞ | | -88.7 | | -88.7 |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -66.68 | | -58.92 | | -58.92 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Void  Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. | | | | | | | | | | |

##### A.7.5.3.2.2 Test Requirements

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

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot (m+TL1-RSRP), where TL1-RSRP is no larger than

3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, TFirstSSB\_MAX=TSMTC\_MAX=Trs=20ms; TL1-RSRP, measure=480ms and TL1-RSRP, measure=5ms, which allows TL1-RSRP 1000ms.

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

- THARQ is defined in Table A.5.5.3.1.1-2

- Tactivation\_time = 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 1030ms

- TCSI\_Reporting = 10ms

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

During T3 the UE shall stop sending CSI reports for both SCells no later than slot , as defined in clause 8.3.

During T2 interruption of PCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.7.

<< End of changes >>

<< Unchanged sections skipped >>

<< Start of change >>

A.7.5.5 Beam Failure Detection and Link recovery procedures

A.7.5.5.1 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.1.1 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 FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.1.1-1, A.7.5.5.1.1-2, A.7.5.5.1.1-3 and A.7.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.1.1-1 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.7.5.5.1.1-1 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 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

**Table A.7.5.5.1.1-1: Supported test configurations for FR2 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

**Table A.7.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Value** | **Comment** |
|  | | | | |  | **Test 1** |  |
| Active PCell | | | | |  | Cell 1 |  |
| RF Channel Number | | | | |  | 1 |  |
| Duplex mode | | Config 1, 2 | | |  | TDD |  |
| BWchannel | | Config 1, 2 | | |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | Config 1, 2 | | |  | 66 |  |
| DL initial BWP configuration | | Config 1, 2 | | |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | Config 1, 2 | | |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | Config 1, 2 | | |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | Config 1, 2 | | |  | ULBWP.1.1 |  |
| TDD Configuration | | Config 1, 2 | | |  | TDDConf.3.1 |  |
| CORESET Reference Channel | | Config 1, 2 | | |  | CR. 3.1 TDD |  |
| SSB Configuration | | Config 1 | | |  | SSB.1 FR2 |  |
| Config 2 | | |  | SSB.2 FR2 |  |
| SMTC Configuration | | Config 1, 2 | | |  | SMTC.3 |  |
| PDSCH/PDCCH subcarrier spacing | | Config 1, 2 | | |  | 120 KHz |  |
| PRACH Configuration | | Config 1, 2 | | |  | FR2 PRACH configuration 2 | A.3.8.3 |
| SSB index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | | | |  | 1 |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| Beam | DCI format | | | |  | 1-0 |  |
| failure detection | Number of Control OFDM symbols | | | |  | 2 |  |
| transmission parameters | Aggregation level | | | | CCE | 8 |  |
|  | 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 |  |
| DRX | | | | |  | OFF |  |
| Gap pattern ID | | | | |  | gp0 |  |
| gapOffset | | | | |  | 0 |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp- | | | Config 1 | | dBm/SSB | -94.5 | Threshold used |
| ThresholdSSB | | | Config 2 | | SCS | -91.5 | for Qin\_LR\_SSB |
| powerControlOffsetSS | | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for CSI reporting | | | | Config 1, 2 |  | CSI-RS.3.1 TDD |  |
| TCI states | | | | |  | TCI.State.0 | TCI.State.0 |
| CSI-RS for tracking | | | | Config 1, 2 |  | TRS.2.1 TDD |  |
| SSB index assigned as RLM RS | | | | |  | 0, 1 |  |
| T310 Timer | | | | | ms | 1000 |  |
| N310 | | | | |  | 2 |  |
| T1 | | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | 2.61 |  |
| T3 | | | | | s | 1.64 |  |
| T4 | | | | | S | 0 |  |
| T5 | | | | | s | 1.01 |  |
| D1 | | | | | s | 0.97 |  |
| 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. | | | | | | | |

*Editor’s note: An additional RS for RLM, different from BFD-RS at constant high SNR shall be configured as part of the test configuration.*

**Table A.7.5.5.1.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| 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 | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
|  | Config 2 |  | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
|  | Config 2 |  | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/SSB | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 2 | SCS | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | Config 1 | dBm/120 KHz | -104.7 | | | | |
|  | Config 2 |  | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

**Table A.7.5.5.1.1-4: Void**

****

**Figure A.7.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

A.7.5.5.1.2 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 = 960+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

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

A.7.5.5.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode

A.7.5.5.2.1 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 FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.2.1-1, A.7.5.5.2.1-2, A.7.5.5.2.1-3, A.7.5.5.2.1-4 and A.7.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.2.1-1 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.7.5.5.2.1-1 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 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.5.5.2.1-1: Supported test configurations for FR2 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth |
| 2 | TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth |
| Note: The UE is only required to pass in one of the supported test configurations in FR2 | |

**Table A.7.5.5.2.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | **Unit** | **Value** | **Comment** |
|  | | | | |  | **Test 1** |  |
| Active PCell | | | | |  | Cell 1 |  |
| RF Channel Number | | | | |  | 1 |  |
| Duplex mode | | | Config 1, 2 | |  | TDD |  |
| BWchannel | | | Config 1, 2 | |  | 100: NRB,c = 66 |  |
| Data RBs allocated | | | Config 1, 2 | |  | 66 |  |
| DL initial BWP configuration | | | Config 1, 2 | |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | | | Config 1, 2 | |  | DLBWP.1.1 |  |
| UL initial BWP configuration | | | Config 1, 2 | |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | | | Config 1, 2 | |  | ULBWP.1.1 |  |
| TDD Configuration | | | Config 1, 2 | |  | TDDConf.3.1 |  |
| RMSI CORESET Reference Channel l | | | Config 1 | |  | CR.3.1 TDD |  |
| Config 2 | | CR.3.2 TDD |
| SSB Configuration | | | Config 1 | |  | SSB.1 FR2 |  |
|  | | | Config 2 | |  | SSB.2 FR2 |  |
| SMTC Configuration | | | Config 1, 2 | |  | SMTC.3 |  |
| PDSCH/PDCCH subcarrier spacing | | | Config 1, 2 | |  | 120 KHz |  |
| PRACH Configuration | | | Config 1, 2 | |  | FR2 PRACH configuration 2 | A.3.8.3 |
| SSB index assigned as BFD RS (q0) | | | | |  | 0 |  |
| SSB index assigned as CBD RS (q1) | | | | |  | 1 |  |
| OCNG parameters | | | | |  | OP.1 |  |
| CP length | | | | |  | Normal |  |
| Beam | DCI format | | | |  | 1-0 |  |
| failure detection | Number of Control OFDM symbols | | | |  | 2 |  |
| transmission parameters | Aggregation level | | | | CCE | 8 |  |
|  | 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 |  |
| DRX | | | | |  | DRX.3 | A.3.3.3 |
| Gap pattern ID | | | | |  | N.A. |  |
| rlmInSyncOutOfSyncThreshold | | | | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | Config 1 | | | dBm/SSB | -94.5 | Threshold used for Qin\_LR\_SSB |
| Config 2 | | | SCS | -91.5 |
| powerControlOffsetSS | | | | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | | | | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | | | | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for CSI reporting | | | | Config 1, 2 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| TCI states | | | | |  | TCI.State.0 | TCI.State.0 |
| CSI-RS for tracking | | | | Config 1, 2 |  | TRS.2.1 TDD |  |
| SSB index assigned as RLM RS | | | | |  | 0, 1 |  |
| T310 Timer | | | | | ms | 1000 |  |
| N310 | | | | |  | 2 |  |
| T1 | | | | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | | | | s | 3.37 |  |
| T3 | | | | | s | 2.8 |  |
| T4 | | | | | s | 0 |  |
| T5 | | | | | s | 0.61 |  |
| D1 | | | | | s | 0.57 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | | | | |

**Table A.7.5.5.2.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| 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 | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
|  | Config 2 |  | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
|  | Config 2 |  | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/SSB | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 2 | SCS | -101.5 | -101.5 | -81.5 | -81.5 | -81.5 |
|  | Config 1 | dBm/120 KHz | -104.7 | | | | |
|  | Config 2 |  | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

**Table A.7.5.5.2.1-4: Void**

**Table A.7.5.5.2.1-5: Void**

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**Figure A.7.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode**

A.7.5.5.2.2 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 = 560+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

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

A.7.5.5.3 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.7.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.3.1-1, A.7.5.5.3.1-2, and A.7.5.5.3.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

**Table A.7.5.5.3.1-1: Supported test configurations for FR2 PCell**

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

**Table A.7.5.5.3.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| **Test 1** |
| Active PCell | |  | Cell 1 |  |
| RF Channel Number | |  | 1 |  |
| Duplex mode | Config 1 |  | TDD |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1 |  | 66 |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |  |
| CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | A.3.1.2 |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | A.3.10 |
| SMTC Configuration | Config 1 |  | SMTC.3 | A.3.11 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120KHz |  |
| PRACH Configuration | Config 1 |  | FR2 PRACH configuration 4 | A.3.8.3 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | |  | 0 |  |
| TRS configuration | |  | TRS.2.1 TDD |  |
| PDSCH/PDCCH TCI state | |  | TCI.State.2 |  |
| OCNG parameters | |  | OP.1 | A.3.2.1 |
| CP length | |  | Normal |  |
| Beam failure detection transmission parameters | DCI format |  | 1-0 |  |
| Number of Control OFDM symbols |  | 2 |  |
| Aggregation level | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
| DMRS precoder granularity |  | REG bundle size |  |
| REG bundle size |  | 6 |  |
| DRX | |  | OFF |  |
| Gap pattern ID | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | dBm/SCS kHz | -94.5 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for q0 and q1 | Config 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| csi-RS-Index assigned as RLM RS | |  | 0, 1 | A.3.14.2 |
| T310 Timer | | ms | 1000 |  |
| N310 | |  | 2 |  |
| T1 | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | s | 1.17 |  |
| T3 | | s | 0.9 |  |
| T4 | | s | 0 |  |
| T5 | | s | 0.31 |  |
| D1 | | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

**Table A.7.5.5.3.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS kHz | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/15 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.3.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

**Table A.7.5.5.3.1-4: Void**

**Table A.7.5.5.3.1-5: Void**

****

**Figure A.7.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode**

A.7.5.5.3.2 Test Requirements

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

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

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

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

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

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

A.7.5.5.4 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.7.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.4.1-1, A.7.5.5.4.1-2, A.7.5.5.4.1-3, and A.7.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.5.5.4.1-1: Supported test configurations for FR2 PCell**

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

**Table A.7.5.5.4.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| **Test 1** |
| Active PCell | |  | Cell 1 |  |
| RF Channel Number | |  | 1 |  |
| Duplex mode | Config 1 |  | TDD |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1 |  | 66 |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |  |
| CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | A.3.1.2 |
| SSB Configuration | Config 1 |  | SSB.1 FR2 | A.3.10 |
| SMTC Configuration | Config 1 |  | SMTC.3 | A.3.11 |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |  |
| PRACH Configuration | Config 1 |  | FR2 PRACH configuration 4 | A.3.8.3 |
| csi-RS-Index assigned as beam failure detection RS in set q0 | |  | 0 |  |
| TRS configuration | |  | TRS.2.1 TDD |  |
| PDSCH/PDCCH TCI state | |  | TCI.State.2 |  |
| OCNG parameters | |  | OP.1 | A.3.2.1 |
| CP length | |  | Normal |  |
| Beam failure detection transmission parameters | DCI format |  | 1-0 |  |
| Number of Control OFDM symbols |  | 2 |  |
| Aggregation level | CCE | 8 |  |
| Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy | dB | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy | dB | 0 |  |
| DMRS precoder granularity |  | REG bundle size |  |
| REG bundle size |  | 6 |  |
| DRX | |  | DRX.3 | A.3.3.3 |
| Gap pattern ID | |  | N.A. |  |
| csi-RS-Index assigned as candidate beam detection RS in set q1 | |  | 1 |  |
| rlmInSyncOutOfSyncThreshold | |  | absent | When the field is absent, the UE applies the value 0. (Table 8.1.1-1). |
| rsrp-ThresholdSSB | | dBm/SCS kHz | -94.5 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | |  | n1 | see clause 5.17 of TS 38.321 [7] |
| beamFailureDetectionTimer | |  | pbfd4 | see clause 5.17 of TS 38.321 [7] |
| CSI-RS configuration for q0 and q1 | Config 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| csi-RS-Index assigned as RLM RS | Config 1 |  | CSI-RS.3.2 TDD | A.3.14.2 |
| T310 Timer | | ms | 1000 |  |
| N310 | |  | 2 |  |
| T1 | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | s | 5.43 |  |
| T3 | | s | 5.16 |  |
| T4 | | s | 0 |  |
| T5 | | s | 0.31 |  |
| D1 | | s | 0.27 |  |
| Note 1: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

**Table A.7.5.5.4.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA setup | |  | Setup 1 defined in A.3.15 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PDSCH to PDSCH DMRS | | dB |  | | | | |
| EPRE ratio of OCNG DMRS to SSS | | dB |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS | | dB |  | | | | |
| SNR\_CSI-RS of set q0 | Config 1 | dB | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_CSI-RS of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| CSI-RS\_RP of set q1 | Config 1 | dBm/SCS kHz | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/120 KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.4.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

**Table A.7.5.5.4.1-4: Void**

**Table A.7.5.5.4.1-5: Void**

**Table A.7.5.5.4.1-6: Void**

****

**Figure A.7.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode**

A.7.5.5.4.2 Test Requirements

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

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

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

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

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q1. The UE shall not transmit preamble on a beam associated with the candidate beam set q1 earlier than time point B.

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

A.7.5.5.5 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.7.5.5.5.1-1, A.7.5.5.5.1-2 and A.7.5.5.5.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.5.1-1 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.7.5.5.5.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. This test will focus on the scheduling availability during beam failure detection) and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

**Table A.7.5.5.5.1-1: Supported test configurations for FR2 PCell**

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

**Table A.7.5.5.5.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| **Test 1** |  |
| Active PCell | |  | Cell 1 |  |
| RF Channel Number | |  | 1 |  |
| Duplex mode | Config 1 |  | TDD |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 |  |
| Data RBs allocated | Config 1 |  | 66 |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |  |
| DL initial BWP configuration | Config 1 |  | DLBWP.0.1 |  |
| DL dedicated BWP configuration | Config 1 |  | DLBWP.1.1 |  |
| UL initial BWP configuration | Config 1 |  | ULBWP.0.1 |  |
| UL dedicated BWP configuration | Config 1 |  | ULBWP.1.1 |  |
| CORESET Reference Channel | Config 1 |  | CR. 3.1 TDD |  |
| SSB Configuration | Config 1 |  | SSB.1 FR2 |  |
| SMTC Configuration | Config 1 |  | SMTC.1 |  |
| PDSCH/PDCCH subcarrier spacing | Config 1 |  | 120 KHz |  |
| PRACH  Configuration | Config 1 |  | FR2 PRACH configuration 2 | A.3.8.3 |
| SSB index assigned as BFD RS (q0) | |  | 0 |  |
| SSB index assigned as CBD RS (q1) | |  | 1 |  |
| TRS configuration | |  | TRS.2.1 TDD |  |
| TCI configuration | |  | TCI.State.0 |  |
| OCNG parameters | |  | OP.1 |  |
| CP length | |  | Normal |  |
| Beam failure detection 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 | 0 |  |
| Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy | dB | 0 |  |
| DMRS precoder granularity |  | REG bundle size |  |
| REG bundle size |  | 6 |  |
| DRX | |  | OFF | DRX is not in use |
| Gap pattern ID | |  | N.A. | No measurement gap pattern is configured |
| ssb-Index | |  | 2 | Number of SSB indexes used for beam failure detection |
| rlmInSyncOutOfSyncThreshold | |  | absent | When the field is absent, the UE applies the 10% |
| rsrp-ThresholdSSB | | dBm/SCS kHz | -94.5 | Threshold used for Qin\_LR\_SSB |
| powerControlOffsetSS | |  | db0 | Used for deriving rsrp-ThresholdCSI-RS |
| beamFailureInstanceMaxCount | |  | n1 | see TS 38.321 [7], clause 5.17 |
| beamFailureDetectionTimer | |  | pbfd4 | see TS 38.321 [7], clause 5.17 |
| CSI Configuration for reporting | Config 1 |  | CSI-RS.3.1 TDD | A.3.14.2 |
| T310 Timer | | ms | 1000 |  |
| N310 | |  | 2 |  |
| T1 | | s | 1 | During this time the the UE shall be fully synchronized to cell 1 |
| T2 | | s | 2.6 |  |
| T3 | | s | 1.64 |  |
| T4 | | s | 0 |  |
| T5 | | s | 1.01 |  |
| D1 | | s | 0.97 |  |
| Note 1: All configurations are assigned to the UE prior to the start of time period T1.  Note 2: UE-specific PDCCH is not transmitted after T1 starts. | | | | |

**Table A.7.5.5.5.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | | | |
|  | |  | **T1** | **T2** | **T3** | **T4** | **T5** |
| AoA Setup | |  | Setup1 defined in A.3.15.1 | | | | |
| Assumption for UE beams Note 10 | |  | Rough | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | dB | 0 | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB |  | | | | |
| EPRE ratio of PBCH DMRS to SSS | | dB |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | dB |  | | | | |
| EPRE ratio of PSS to SSS | | dB |  | | | | |
| 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 | 5Note 11 | -3Note 11 | -12 | -12 | -12 |
| SNR\_SSB of set q1 | Config 1 | dB | 0.2 | 0.2 | 20.2 | 20.2 | 20.2 |
| SSB\_RP of set q1 | Config 1 | dBm/SCS kHz | -104.5 | -104.5 | -84.5 | -84.5 | -84.5 |
|  | Config 1 | dBm/15KHz | -104.7 | | | | |
| Propagation condition | |  | TDL-A 30ns 75Hz | | | | |
| Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Void  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.5.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.  Note 10: Information about types of UE beam given in B.2.1.3 and does not limit UE implementation or test system implementation  Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband | | | | | | | |

****

**Figure A.7.5.5.5.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode**

A.7.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

<< End of changes >>

<< Unchanged sections skipped >>

<< Start of changes >>

#### A.7.5.7.1 Addition and Release Delay of known NR PSCell

##### A.7.5.7.1.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is known to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.1.1-2, A.7.5.7.1.1-3 and A.7.5.7.1.1-4 below. The test consists of five time periods with durations T1, T2, T3, T4 and T5, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. Before the start of T2, the test system shall send measurement control information including measurement gap configuration and event-triggered reporting configuration for measurements on radio channel 2.

During T2, the UE shall identify Cell 2 and send an event-triggered report. When the tests system receives the report, it shall send updated measurement control information where the measurement gap pattern is released. Before the start of T3, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T3.

During T3, the UE shall carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T4.

During T4, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T5.

During T5, the UE shall release the PSCell.

**Table A.7.5.7.1.1-1: Supported test configurations for FR2 PSCell**

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

**Table A.7.5.7.1.1-2: General test parameters for PSCell addition and release delay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test |
| Active PCell | |  | Cell 1 | PCell on RF channel number 1 in FR1 |
| Neighbour cell | |  | Cell 2 | Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2 |
| A4 | Hysteresis | dB | 0 | Hysteresis for event A4 |
| Threshold RSRP | dBm | -118 | Threshold for event A4 |
| Time to Trigger | S | 0 | Time to trigger for event A4 |
| DRX | |  | OFF | For both PCell and PSCell once activated |
| Measurement gap pattern ID | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration in Cell 2 | |  | FR2 PRACH configuration 2 | PRACH configuration as specified in Clause A.3.8.3.2. |
| CSI reporting periodicity and offset configuration for Cell 2 | | ms | 2 |  |
| T1 | | s | 5 | During this time the PCell is known and Cell 2 is unknown. |
| T2 | | s | 1 | During this time the UE shall identify neighbour cell 2 and report event B1. |
| T3 | | s | 1 | During this time the UE adds the PSCell. |
| T4 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T5 | | s | 1 | During this time the UE releases the PSCell. |

**Table A.7.5.7.1.1-3: NR Cell specific test parameters for PSCell addition and release delay**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell2** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| Frequency Range |  | 1,2,3 | FR1 | FR2 | | | | |
| Duplex mode |  | 1 | FDD | TDD | | | | |
| 2,3 | TDD |
| TDD configuration |  | 1 | – | TDDConf.3.1 | | | | |
| 2 | TDDConf.1.1 |
| 3 | TDDConf.2.1 |
| BWchannel | MHz | 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 | | | | |
| 3 | 40: NRB,c = 106 |
| Data RBs allocated |  | 1,2 | 52 | 48 | | | | |
| 3 | 106 |
| Initial Downlink BWP configuration |  | 1,2,3 | DLBWP.0.1 | DLBWP.0.1 | | | | |
| Initial Uplink BWP configuration |  | 1,2,3 | ULBWP.0.1 | ULBWP.0.1 | | | | |
| Dedicated Downlink BWP configuration |  | 1,2,3 | DLBWP.1.1 | DLBWP.1.1 | | | | |
| Dedicated Uplink BWP configuration |  | 1,2,3 | ULBWP.1.1 | ULBWP.1.1 | | | | |
| PDSCH Reference Measurement Channel |  | 1 | SR.1.1 FDD | SR.3.3 TDD | | | | |
| 2 | SR.1.1 TDD |
| 3 | SR.2.1 TDD |
| TRS configuration |  | 1,2,3 | – | TRS.2.1 TDD | | | | |
| TCI state |  | 1,2,3 | – | TCI.State.0 | | | | |
| RMSI CORESET parameters |  | 1 | CR.1.1 FDD | CR.3.2 TDD | | | | |
| 2 | CR.1.1 TDD |
| 3 | CR.2.1 TDD |
| Dedicated CORESET parameters |  | 1 | CCR.1.1 FDD | CCR.3.7 TDD | | | | |
| 2 | CCR.1.1 TDD |
| 3 | CCR.2.1 TDD |
| OCNG PatternsNote1 |  | 1,2,3 | OP.1 | OP.3 | | | | |
| SSB configuration |  | 1,2 | SSB.1 FR1 | SSB.2 FR2 | | | | |
| 3 | SSB.2 FR1 |
| SMTC configuration |  | 1,2,3 | SMTC.2 | SMTC.1 | | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 15 | 120 | | | | |
| 3 | 30 |
| EPRE ratio of PSS to SSS | dB | 1,2,3 | 0 | 0 | | | | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH |
| EPRE ratio of OCNG DMRS to SSS |
| EPRE ratio of OCNG to OCNG DMRS |
| Propagation Condition |  | 1,2,3 | N/A | AWGN | | | | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | | | |

**Table A.7.5.7.1.1-4: OTA related test parameters for PSCell addition and release delay**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell 2** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| Angle of arrival configuration |  | 1,2,3 | Link only, see clause A.3.7A | Setup 2a according to clause A.3.15.2.1 | | | | |
| Assumption for UE beams Note 3 |  |  | Rough | | | | |
| Ês | dBm/SCS | 1,2,3 | -∞ | -81 | | | |
| SSB\_RP Note1, Note2 | dBm/SCS | 1,2,3 | -∞ | -81 | | | |
| BB Note1, Note 4 | dB | 1,2,3 | -∞ | 4.88 | | | |
| Io Note 1, Note2 | dBm/95.04 MHz | 1,2,3 | N/A | -56.41 | | | |
| Note 1: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.  Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 4: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | | |

A.7.5.7.1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 112 ms into T3.

The UE shall transmit at least one periodic CSI report for PSCell during T4.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T5.

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

#### A.7.5.7.2 Addition and Release Delay of unknown NR PSCell

##### A.7.5.7.2.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is unknown to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.2.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.2.1-2, A.7.5.7.2.1-3 and A.7.5.7.2.1-4 below. The test consists of four time periods with durations T1, T2, T3 and T4, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. At the end of T1, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T2.

During T2, the UE shall identify PSCell and carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T3.

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

During T4, the UE shall release the PSCell.

**Table A.7.5.7.2.1-1: Supported test configurations for FR2 PSCell**

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

**Table A.7.5.7.2.1-2: General test parameters for PSCell addition and release delay**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1, 2 | Two radio channels are used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1 in FR1 |
| Neighbour cell |  | Cell 2 | Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2 |
| DRX |  | OFF | For both PCell and PSCell once activated |
| PRACH configuration in Cell 2 |  | FR2 PRACH configuration 2 | PRACH configuration as specified in Clause A.3.8.3.2. |
| CSI reporting periodicity and offset configuration for Cell 2 | ms | [2] |  |
| T1 | s | 5 | During this time the PCell is known and Cell 2 is unknown. |
| T2 | s | 1 | During this time the UE adds the PSCell. |
| T3 | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T4 | s | 1 | During this time the UE releases the PSCell. |

Table A.7.5.7.2.1-3: NR Cell specific test parameters for PSCell addition and release delay

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell2** | | | |
| **T1** | **T2** | **T3** | **T4** |
| Frequency Range |  | 1,2,3 | FR1 | FR2 | | | |
| Duplex mode |  | 1 | FDD | TDD | | | |
| 2,3 | TDD |
| TDD configuration |  | 1 | – | TDDConf.3.1 | | | |
| 2 | TDDConf.1.1 |
| 3 | TDDConf.2.1 |
| BWchannel | MHz | 1,2 | 10: NRB,c = 52 | 100: NRB,c = 66 | | | |
| 3 | 40: NRB,c = 106 |
| Data RBs allocated |  | 1,2 | 52 | 48 | | | |
| 3 | 106 |
| Initial Downlink BWP configuration |  | 1,2,3 | DLBWP.0.1 | DLBWP.0.1 | | | |
| Initial Uplink BWP configuration |  | 1,2,3 | ULBWP.0.1 | ULBWP.0.1 | | | |
| Dedicated Downlink BWP configuration |  | 1,2,3 | DLBWP.1.1 | DLBWP.1.1 | | | |
| Dedicated Uplink BWP configuration |  | 1,2,3 | ULBWP.1.1 | ULBWP.1.1 | | | |
| PDSCH Reference Measurement Channel |  | 1 | SR.1.1 FDD | SR.3.3 TDD | | | |
| 2 | SR.1.1 TDD |
| 3 | SR.2.1 TDD |
| TRS configuration |  | 1,2,3 | – | TRS.2.1 TDD | | | |
| TCI state |  | 1,2,3 | – | TCI.State.0 | | | |
| RMSI CORESET parameters |  | 1 | CR.1.1 FDD | CR.3.2 TDD | | | |
| 2 | CR.1.1 TDD |
| 3 | CR.2.1 TDD |
| Dedicated CORESET parameters |  | 1 | CCR.1.1 FDD | CCR.3.7 TDD | | | |
| 2 | CCR.1.1 TDD |
| 3 | CCR.2.1 TDD |
| OCNG PatternsNote1 |  | 1,2,3 | OP.1 | OP.3 | | | |
| SSB configuration |  | 1,2 | SSB.1 FR1 | SSB.2 FR2 | | | |
| 3 | SSB.2 FR1 |
| SMTC configuration |  | 1,2,3 | SMTC.2 | SMTC.1 | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 15 | 120 | | | |
| 3 | 30 |
| EPRE ratio of PSS to SSS | dB | 1,2,3 | 0 | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH |
| EPRE ratio of OCNG DMRS to SSS |
| EPRE ratio of OCNG to OCNG DMRS |
| Propagation Condition |  | 1,2,3 | AWGN | AWGN | | | |
| Note 1: OCNG shall be used such that and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | | |

**Table A.7.5.7.2.1-4: OTA related test parameters for PSCell addition and release delay**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell 2** | | | |
| **T1** | **T2** | **T3** | **T4** |
| Angle of arrival configuration |  | 1,2,3 | Link only, see clause A.3.7A | Setup 2a according to clause A.3.15.2.1 | | | |
| Assumption for UE beams Note 3 |  |  | Rough | | | |
| Ês | dBm/SCS | 1,2,3 | -∞ | -81 | | |
| SSB\_RP Note1, Note 2 | dBm/SCS | 1,2,3 | -∞ | -81 | | |
| BB Note1, Note 4 | dB | 1,2,3 | -∞ | 4.88 | | |
| Io Note 1, Note 2 | dBm/95.04 MHz | 1,2,3 | N/A | -56.41 | | |
| Note 1: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.  Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 4: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

A.7.5.7.2.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 572 ms into T2.

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

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

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

<< End of changes >>

<< Unchanged sections skipped >>

<<Start of change>>

A.7.5.8 Active TCI state switch delay

#### A.7.5.8.1 MAC-CE based active TCI state switch

A.7.5.8.1.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.8.1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.1.1.1-3 below. The OTA related test parameters for FR2 are shown in Table A.7.5.8.1.1.1-4.

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

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE is configured with 2 different TCI states for PCell, PDCCH TCI state 0 (QCL’d to SSB0) and TCIstate 1 (QCL’d to SSB1), in Cell 1 before starting the test.

- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which PDCCH-TCI-state0 is QCL’d is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PCell on TCI state 0 till n+ THARQ +3 ms. The test equipment also verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ THARQ +3 ms + (Tfirst-SSB + TSSB-proc) .

**Table A.7.5.8.1.1.1-1: Supported test configurations**

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

**Table A.7.5.8.1.1.1-2: General test parameters for TCI state switch**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |

**Table A.7.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Data RBs allocated |  | 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3.2 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.5 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| TCI State 0 |  | TC. State.0 |
| TCI State 1 |  | TCI.State.1 |
| TRS Configuration |  | TRS.2.1 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| EPRE ratio of PSS to SSS | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

**Table A.7.5.8.1.1.1-4: OTA related test parameters for TCI state switch**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | | | | |
|  |  | SSB0 | | SSB1 | | |
|  |  | T1 | T2 | T1 | | T2 |
| Angle of arrival configuration |  | Setup 3 According to clause A.3.15.3 | | | | |
|  |  | AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 |  | Rough | | | Rough | |
| Ês | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| SSB-RP Note 2 | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| BB Note 7 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| Io Note2 | dBm/95.04 MHz Note4 | -56.0 | -56.0 | - Infinity | | -56.0 |
| Note 1: Void  Note 2: SSB-RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 7: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

A.7.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till n+ THARQ +3 ms

- be able to start receiving on TCI state 1 after n+ THARQ +5 ms + Tfirst-SSB

#### A.7.5.8.2 RRC based active TCI state switch

A.7.5.8.2.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.2.1.1-1.

The test scenario comprises of one NR PCell as given in Table A.7.5.8.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.8.2.1.1-4.

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

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE is configured with 1 TCI state for PCell, PDCCH-TCI-state0 (QCL’d to SSB0)

- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which TCI-state0 is QCL’d is transmitted. At the beginning of T2, the SSB corresponding to TCI-state1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ TRRC\_processing  + Tfirst-SSB + 2ms.

**Table A.7.5.8.2.1.1-1: Supported test configurations**

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

**Table A.7.5.8.2.1.1-2: General test parameters for TCI state switch**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 |  |

**Table A.7.5.8.2.1.1-3: NR Cell specific test parameters for TCI state switch**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Data RBs allocated |  | 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3.2 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.5 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| TCI State 0 |  | TC. State.0 |
| TCI State 1 |  | TCI.State.1 |
| reportConfigType |  | ssb-Index-RSRP |
| reportConfigType |  | periodic |
| Number of reported RS |  | 2 |
| L1-RSRP reporting period | slot | 640 |
| timeRestrictionForChannelMeasurements |  | configured |
| TRS Configuration |  | TRS.2.1 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| EPRE ratio of PSS to SSS | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |
| Propagation Condition |  | AWGN |
| 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. | | |

**Table A.7.5.8.2.1.1-4: OTA related test parameters for TCI state switch**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | |
| **SSB0** | | **SSB1** | | |
| **T1** | **T2** | **T1** | | **T2** |
| Angle of arrival configuration |  | Setup 3 According to clause A.3.15.3 | | | | |
| AoA1 | | | AoA2 | |
| Assumption for UE beams Note 6 |  | Rough | | | Rough | |
| Ês | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| SSB-RP Note 2 | dBm/SCS | -80.6 | -80.6 | -Infinity | | -80.6 |
| BB Note 7 | dB | 8.3 | 8.3 | -Infinity | | 8.3 |
| Io Note2 | dBm/95.04 MHz Note4 | -56.0 | -56.0 | - Infinity | | -56.0 |
| Note 1: Void  Note 2: SSB-RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.  Note 7: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

A.7.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ TRRC\_processing  + Tfirst-SSB + 2ms.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

#### A.7.6.2.5 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)

##### A.7.6.2.5.1 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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.5.1-1, A.7.6.2.5.1-2, and A.7.6.2.5.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 no gap pattern is configured as defined in Table A.7.6.2.5.1-2. If the UE supports per-FR gap, 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 A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.5.1-1.

Table A.7.6.2.5.1-1 SA event triggered reporting tests without SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Table A.7.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 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 | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 0 | Gap not configured | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | N/A |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 2 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 3 | SSB.2 FR1 | | As specified in clause A.3.10.1 |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1 | TRS.1.1 FDD | |  |
|  | Config 2 | TRS.1.1 TDD | |  |
|  | Config 3 | TRS.1.2 TDD | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| *offsetMO* | dB | Config 1,2,3 | 6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3 | -105 | |  |
| 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 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 5.2 for PC1; 3.5 for other PC | 3 for PC1; 2 for other PC |  |

Table A.7.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| AoA setup | |  | Config 1,2,3 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | TDD | |
|  | Config 2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | Not Applicable | | TDDConf.3.1 | |
|  | Config 2 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | Config 3 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
| Initial UL BWP |  | ULBWP.0.1 | | N/A | |
| Dedicated DL BWP |  | DLBWP.1.1 | | N/A | |
| Dedicated UL BWP |  | ULBWP.1.1 | | N/A | |
| 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 | SR.1.1 FDD | | - | |
|  | Config 2 | SR.1.1 TDD | |
|  | Config 3 | SR2.1 TDD | |
| RMSI CORESET Reference  Channel | |  | Config 1 | CR.1.1 FDD | | - | |
|  | Config 2 | CR.1.1 TDD | |
|  | Config 3 | CR2.1 TDD | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.1.1 FDD | | - | |
|  | |  | Config 2 | CCR.1.1 TDD | |  | |
|  | |  | Config 3 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.2 | | SMTC.2 | |
|  | Config 2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | 120 | |
| Config 3 | 30 | | 120 | |
| 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) | |  |  |  | |  | |
| Ês | | dBm/SCS | Config 1,2,3 |  | | -Infinity | -87 |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2 |  | | -Infinity | -87 |
| BB Note 8 | | dB | Config 1,2,3 | Link only, see clause | | -Infinity | 14.69 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | A.3.7A | | -Infinity | -58.01 |
| Propagation Condition | |  | Config 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: Void  Note 3: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

##### A.7.6.2.5.2 Test Requirements

In test 1, with per-UE , the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 2, without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

2560 for UE supporting power class 1, or

1600 for UE supporting other power class.

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

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.7.6.2.6 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)

##### A.7.6.2.6.1 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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.6.1-1, A.7.6.2.6.1-2, and A.7.6.2.6.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 no gap pattern is configured as defined in Table A.7.6.2.6.1-2. If a UE supports per-FR gap 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 A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.6.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.6.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Table A.7.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 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 | | | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | Gap not configured | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | | N/A | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 3 | SSB.2 FR1 | | | | As specified in clause A.3.10.1 |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1 | TRS.1.1 FDD | | | |  |
|  | Config 2 | TRS.1.1 TDD | | | |  |
|  | Config 3 | TRS.1.2 TDD | | | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| *offsetMO* | dB | Config 1,2,3 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3 | -105 | | | |  |
| 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.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | | | |  |
| T2 | s | Config 1,2,3 | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC |  |

Table A.7.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| AoA setup | |  | Config 1,2,3 | NA | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | TDD | |
|  | Config 2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | Not Applicable | | TDDConf.3.1 | |
|  | Config 2 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | Config 3 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
| Initial UL BWP |  | ULBWP.0.1 | | N/A | |
| Dedicated DL BWP |  | DLBWP.1.1 | | N/A | |
| Dedicated UL BWP |  | ULBWP.1.1 | | N/A | |
| 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 | SR.1.1 FDD | | - | |
|  | Config 2 | SR.1.1 TDD | |
|  | Config 3 | SR2.1 TDD | |
| RMSI CORESET Reference Channel | |  | Config 1 | CR.1.1 FDD | | - | |
|  | Config 2 | CR.1.1 TDD | |
|  | Config 3 | CR2.1 TDD | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.1.1 FDD | | - | |
|  | |  | Config 2 | CCR.1.1 TDD | |  | |
|  | |  | Config 3 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.2 | | SMTC.2 | |
|  | Config 2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | 120 | |
| Config 3 | 30 | | 120 | |
| 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 Note5 |  | NA  Link only, see clause A.3.7A | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1,2 | -95.7 | |
| Config 3 | -95.7 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2 | -Infinity | -86.7 |
| Config 3 | -Infinity | -86.7 |
|  | | dB | Config 1,2,3 | -Infinity | 9 |
|  | | dB | Config 1,2,3 | -Infinity | 9 |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | - | - |
| dBm/38.16MHz | Config 3 | - | - |
| dBm/95.04 MHz Note5 | Config 1,2,3 | -66.7 | -57.2 |
| Propagation Condition | |  | Config 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

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

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.7.6.2.7 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)

##### A.7.6.2.7.1 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 in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.7.1-1, A.7.6.2.7.1-2, and A.7.6.2.7.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement no gap pattern is configured as defined in Table A.7.6.2.7.1-2. If the UE supports per-FR gap, 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 A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.7.1-1.

Table A.7.6.2.7.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Table A.7.6.2.7.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 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 | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 0 | Gap not configured | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | N/A |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 2 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 3 | SSB.2 FR1 | | As specified in clause A.3.10.1 |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1 | TRS.1.1 FDD | |  |
|  | Config 2 | TRS.1.1 TDD | |  |
|  | Config 3 | TRS.1.2 TDD | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| *offsetMO* | dB | Config 1,2,3 | 6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6 | -105 | |  |
| 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 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 7 for PC1; 4.5 for other PC | 3.5 for PC1; 2.5 for other PC |  |

**Table A.7.6.2.7.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| AoA setup | |  | Config 1,2,3 | NA | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | TDD | |
|  | Config 2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | Not Applicable | | TDDConf.3.1 | |
|  | Config 2 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | Config 3 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
| Initial UL BWP |  | ULBWP.0.1 | | N/A | |
| Dedicated DL BWP |  | DLBWP.1.1 | | N/A | |
| Dedicated UL BWP |  | ULBWP.1.1 | | N/A | |
| 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 | SR.1.1 FDD | | - | |
|  | Config 2 | SR.1.1 TDD | |
|  | Config 3 | SR2.1 TDD | |
| RMSI CORESET Reference  Channel | |  | Config 1 | CR.1.1 FDD | | - | |
|  | Config 2 | CR.1.1 TDD | |
|  | Config 3 | CR2.1 TDD | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.1.1 FDD | | - | |
|  | |  | Config 2 | CCR.1.1 TDD | |  | |
|  | |  | Config 3 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.2 | | SMTC.2 | |
|  | Config 2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | 120 | |
| Config 3 | 30 | | 120 | |
| 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) | |  |  |  | |  | |
| Ês | | dBm/SCS | Config 1,2, 3 |  | | -Infinity | -87 |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2 |  | | -Infinity | -87 |
|  | |  | Config 3 |  | | -Infinity | -87 |
| BB Note 8 | | dB | Config 1,2,3 | Link only, see clause | | -Infinity | 14.69 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | A.3.7A | | Infinity | -58.01 |
| Propagation Condition | |  | Config 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: Void  Note 3: SSB\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 8: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |

##### A.7.6.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 2 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

3360 for UE supporting power class 1, or

2080 for UE supporting other power class.

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

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.7.6.2.8 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)

##### A.7.6.2.8.1 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 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.8.1-1, A.7.6.2.8.1-2, and A.7.6.2.8.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement no gap pattern is configured as defined in Table A.7.6.2.8.1-2.If a UE supports per-FR gap , 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 A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.8.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.8.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

Table A.7.6.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 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 | | | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3 | 0 | | Gap not configured | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | | N/A | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 3 | SSB.2 FR1 | | | | As specified in clause A.3.10.1 |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1 | TRS.1.1 FDD | | | |  |
|  | Config 2 | TRS.1.1 TDD | | | |  |
|  | Config 3 | TRS.1.2 TDD | | | |  |
| SMTC-SSB parameters on NR RF Channel 2 |  | Config 1,2,3 | SSB.3 FR2 | | | | As specified in clause A.3.10.2 |
| *offsetMO* | dB | Config 1,2,3 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3 | -105 | | | |  |
| 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.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 2,3 | 3μs | | | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | | | |  |
| T2 | s | Config 1,2,3 | 11 for PC1; 6.5 for other PCTBD | 108 for PC1; 67 for other PCTBD | 11 for PC1; 6.5 for other PCTBD | 108 for PC1; 67 for other PCTBD |  |

Table A.7.6.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| AoA setup | |  | Config 1,2,3 | NA | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | TDD | |
|  | Config 2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | Not Applicable | | TDDConf.3.1 | |
|  | Config 2 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | Config 3 | TDDConf.2.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| BWP BW | | MHz | Config 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 2 | 10: NRB,c = 52 | | 100: NRB,c = 66 | |
| Config 3 | 40: NRB,c = 106 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | | N/A | |
| Initial UL BWP |  | ULBWP.0.1 | | N/A | |
| Dedicated DL BWP |  | DLBWP.1.1 | | N/A | |
| Dedicated UL BWP |  | ULBWP.1.1 | | N/A | |
| 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 | SR.1.1 FDD | | - | |
|  | Config 2 | SR.1.1 TDD | |
|  | Config 3 | SR2.1 TDD | |
| RMSI CORESET Reference  Channel | |  | Config 1 | CR.1.1 FDD | | - | |
|  | Config 2 | CR.1.1 TDD | |
|  | Config 3 | CR2.1 TDD | |
| Dedicated CORESET RMC configuration | |  | Config 1 | CCR.1.1 FDD | | - | |
|  | |  | Config 2 | CCR.1.1 TDD | |  | |
|  | |  | Config 3 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.2 | | SMTC.2 | |
|  | Config 2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | 120 | |
| Config 3 | 30 | | 120 | |
| 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 Note5 |  | NA  Link only, see clause A.3.7A | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1,2 | -95.7 | |
| Config 3 | -95.7 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2 | -Infinity | -86.7 |
| Config 3 | -Infinity | -86.7 |
|  | | dB | Config 1,2,3 | -Infinity | 9 |
|  | | dB | Config 1,2,3 | -Infinity | 9 |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | - | - |
| dBm/38.16MHz | Config 3 | - | - |
| dBm/95.04 MHz Note5 | Config 1,2,3 | -66.7 | -57.2 |
| Propagation Condition | |  | Config 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: SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SSB\_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | | | |

##### A.7.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

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

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.

<<End of change>>

<<Unchanged sections skipped>>

<< Start of changes >>

#### A.7.7.1.3 SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

##### A.7.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.7.7.1.3.1-1.

Table A.7.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

##### A.7.7.1.3.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) in FR1 and Cell 2 in FR2 . The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2 below. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.3.2-1: SS-RSRP inter-frequency test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Config | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN | 1~3 |  | freq1 | freq2 | freq1 | freq2 |
| BWchannel | 1 | MHz | 10:  NRB,c = 52 | 100:  NRB,c = 66 | 10:  NRB,c = 52 | 100:  NRB,c = 66 |
| 2 | 10:  NRB,c = 52 | 10:  NRB,c = 52 |
| 3 | 40:  NRB,c = 106 | 40:  NRB,c = 106 |
| Data RBs allocated | 1,2 |  | 52 | 24 | 52 | 66 |
| 3 | 106 | 106 |
| Duplex mode | 1 |  | FDD | TDD | FDD | TDD |
| 2 | TDD | TDD |
| 3 | TDD | TDD |
| TDD configuration | 1 |  | N/A | TDDConf.3.1 | N/A | TDDConf.3.1 |
| 2 | TDDConf.1.1 | TDDConf.1.1 |
| 3 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH Reference measurement channel | 1 |  | SR.1.1 FDD | - | SR.1.1 FDD | - |
| 2 | SR.1.1 TDD | SR.1.1 TDD |
| 3 | SR.2.1 FDD | SR.2.1 FDD |
| RMSI CORESET Reference Channel | 1 |  | CR.1.1 FDD | - | CR.1.1 FDD | - |
| 2 | CR.1.1 TDD | - | CR.1.1 TDD | - |
| 3 | CR.2.1 FDD | - | CR.2.1 FDD | - |
| Dedicated CORESET Reference Channel | 1 |  | CCR.1.1 FDD | - | CCR.1.1 FDD | - |
| 2 |  | CCR.1.1 TDD | - | CCR.1.1 TDD | - |
| 3 |  | CCR.2.1 TDD | - | CCR.2.1 TDD | - |
| SSB configuration | 1 |  | SSB.1 FR1 | SSB.3 FR2 | SSB.1 FR1 | SSB.3 FR2 |
| 2 | SSB.1 FR1 | SSB.1 FR1 |
| 3 | SSB.2 FR1 | SSB.2 FR1 |
| OCNG Patterns | 1~3 |  | OP.1 | OP.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.1.3  ULBWP.1.3 | | DLBWP.1.3  ULBWP.1.3 | |
| TRS Configuration | 1~3 |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| PDCCH/PDSCH TCI Configuration | 1~3 |  | TCI.State.2 | | TCI.State.2 | |
| SMTC configuration | 1~3 |  | SMTC.1 | | SMTC.1 | |
| Time offset between Cell 2 and Cell 1 | 1~3 | μs | 3 | | 3 | |
| EPRE ratio of PSS to SSS | 1~3 | dB | 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 DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation condition | 1~3 | - | NA  Link only, see clause A.3.7A | AWGN | NA  Link only, see clause A.3.7A | 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: Void | | | | | | |

Table A.7.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Config** | **Unit** | **Test 1** | | **Test 2** NOTE 3 | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration according to clause A.3.15 |  |  | NA | Setup 2b | NA | Setup 2b |
| Assumption for UE beamsNote 4 |  |  | N/A | Rough | N/A | Rough |
|  | 1~3 | dBm/15kHz | NA  Link only, see clause A.3.7A | -90 | NA  Link only, see clause A.3.7A | NA |
|  | 1~3 | dBm/SSB SCS | -80.97 | NA |
|  | 1~3 | dB | 5 | NA |
|  |  |  |  |  |
| Es | 1~3 | dBm/SCS |  | (Table B.2.3-2 Spherical coverage +1dB) |
| SSB\_RPNote1 | 1~3 | dBm/SCS | -76.0 | Table B.2.3-2 Spherical coverage +1dB) |
| BBNote6 | 1~3 | dB | 4.35 | -3.81 |
| IoNote1 | 1~3 | dBm/  95.04MHz | -50.18 | SSB\_RP+28.98 |
|  |  |  |  |  |
| Note 1: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Void  Note 3: No additional noise is added by the test system in Test 2.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Where used, 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 6: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.7.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

<< End of changes >>

<<Unchanged sections skipped>>

<<Start of change>>

### A.7.7.2 SS-RSRQ

#### A.7.7.2.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.1.1.

##### A.7.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.2.1.2-1. . The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.7.7.2.1.2-2 and Table A.7.7.2.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.7.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations**

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

Table A.7.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN | |  | Freq1 | | Freq1 | |
| Duplex mode | |  | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated | |  | 66 | | 66 | |
| 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 | | | |
| TRS configuration | |  | TRS.2.1 TDD |  | TRS.2.1 TDD |  |
| TCI state | |  | TCI.State.0 |  | TCI.State.0 |  |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel | |  | CR.3.1 TDD | - | CR.3.1 TDD |  |
| Control channel RMC | |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration | |  | SMTC.1 | | | |
| SSB configuration | |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement | |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | | dB | 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\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| 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: Void  Note 3: Void  Note 4: Void  Note 5: Void | | | | | | |

Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 9 |  | Rough | | | |
| Note1 | dBm/15kHzNote4 | -95 | | -95 | |
| Note1 | dBm/SCSNote3 | -86 | | -86 | |
|  | dB | 3 | -3 | -3 | 3 |
| SSB\_RPNote2 | dBm/SCS Note4 | -83 | -83 | -89 | -89 |
| SS-RSRQ Note2 | dB | -14.77 | -14.77 | -16.81 | -16.81 |
|  | dB | -1.76 | -1.76 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -50 | | -54 | -54 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal RSRQ+3.5dB to Nominal RSRQ-3.5dB according to the requirements in clause 10.1.8.1.1.Nominal RSRQ is the value shown in table A.7.7.2.1.2-3.

#### A.7.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.7.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

##### A.7.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.2.2.2-2 and Table A.7.7.2.2.2-3.. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

**Table A.7.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations**

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

Table A.7.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | Freq1 | freq2 | freq1 | Freq2 |
| SSB Configuration |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| CSI-RS for tracking |  | TRS.2.1 TDD | - | TRS.2.1 TDD | - |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 66 | | 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| EPRE ratio of PSS to SSS | dB | 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
|  |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | |

Table A.7.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| AoA setup |  | Setup 1 in clause A.3.15. | | Setup 1 in clause A.3.15. | |
| Assumption for UE beamsNote 8 |  | Rough | | Rough | |
| Note1 | dBm/15kHzNote4 | -94.03 | | -94.03 | |
| Note1 | dBm/SCSNote3 | -85.0 | | -85.0 | |
|  | dB | -1.75 | -1.75 | -3 | -1.75 |
| SSB\_RPNote2 | dBm/SCS Note4 | -86.75 | -86.75 | -88 | -88 |
| SS-RSRQNote2 | dB | -14.75 | -14.75 | -15.56 | -15.56 |
|  | dB | -1.75 | -1.75 | -3 | -3 |
| IoNote2 | dBm/95.04 MHz Note4 | -53.8 | -53.8 | -54.25 | -54.25 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRQ, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

A.7.7.3 SS-SINR

#### A.7.7.3.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

##### A.7.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.13.1.1.

##### A.7.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.3.1.2-1. . The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.3.1.2-2 and Table A.7.7.3.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

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

Table A.7.7.3.1.2-2: SS-SINR Intra frequency test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN |  | **Freq2** | | **Freq2** | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 66 | | 66 | |
| 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 | | | |
| DRX cycle configuration | ms | Not applicable | | | |
| TRS configuration |  | TRS.2.1 TDD | | | |
| TCI state |  | TCI.State.0 | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |  | SR.3.1 TDD |  |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD |  |
| Dedicated RMSI CORESET Reference Channel |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 | | | |
| SSB configuration |  | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 | SSB.1 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 |
| SS-RSSI-Measurement |  | Not Applicable | | | |
| EPRE ratio of PSS to SSS | dB | 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | |

Table A.7.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 9 |  | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | |
|  | dB | 4.54 | 2.66 | -3 | -3 |
| SSB\_RPNote2 | dBm/SCS Note4 | -91.46 | -93.34 | -99 | -99 |
| SS-SINR Note2 | dB | 0 | -3.2 | -4.76 | -4.76 |
|  | dB | 0 | -3.2 | -4.76 | -4.76 |
| IoNote2 | dBm/95.04 MHz Note4 | -59.2 | | -64 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-SINR, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

##### A.7.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1.

#### A.7.7.3.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

##### A.7.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

##### A.7.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.3.2.2-2 and Table A.7.7.3.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

**Table A.7.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations**

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

Table A.7.7.3.2.2-2: SS-SINR Inter frequency general test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | **Test 2** | | **Test 3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 66 | | 66 | | 66 | |
| 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 | | | | | |
| DRX cycle configuration | ms | Not applicable | | | | | |
| TRS configuration |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Reference Channel |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| OCNG Patterns |  | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 | OP.1 |
| SMTC configuration |  | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 | SMTC.1 FR2 |
| SSB configuration |  | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 | SSB.3 FR2 |
| PDSCH/PDCCH subcarrier spacing | kHz | 120 | 120 | 120 | 120 | 120 | 120 |
| 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\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| Propagation conditions |  | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void | | | | | | | |

**Table A.7.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Angle of arrival configuration | degrees | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | | Setup 1 according to A.3.15.1 | |
| Assumption for UE beamsNote 10 |  | Rough | | Rough | | Rough | |
| Note1 | dBm/15kHz Note4 | -105 | | -105 | | -105 | |
| Note1 | dBm/SCS Note3 | -96 | | -96 | | -96 | |
|  | dB | -0.5 | -0.5 | 11.0 | 11.0 | -3.0 | -3.0 |
| SSB\_RPNote2 | dBm/SCS Note4 | -96.5 | -96.5 | -85 | -85 | -99 | -99 |
| SS-SINRNote2 | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
|  | dB | -0.5 | -0.5 | 11 | 11 | -3.0 | -3.0 |
| IoNote2 | dBm/95.04 MHz Note4 | -69.3 | | -55.4 | | -65.24 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-SINR, SSB\_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Void  Note 7: Void  Note 8: Void  Note 9: Void  Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR +3dB to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

<<End of change>>

<<Unchanged sections skipped>>

<<Start of change>>

Table A.8.4.2.1.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
| T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
| 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
| 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
| 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 4 | SMTC.2 | |
| 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
| 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
| 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS |  |
| EPRE ratio of PDSCH to PDSCH |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

<<Unchanged sections skipped>>

Table A.8.4.2.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
| T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
| 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
| 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
| 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 4 | SMTC.2 | |
| 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
| 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
| 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS |  |
| EPRE ratio of PDSCH to PDSCH |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

<<Unchanged sections skipped>>

Table A.8.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
| T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
| 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
| 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
| 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 4 | SMTC.2 | |
| 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
| 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
| 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS |  |
| EPRE ratio of PDSCH to PDSCH |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

<<Unchanged sections skipped>>

Table A.8.4.2.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | |
| T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | |
| Duplex mode |  | 1, 4 | FDD | |
| 2, 3, 5, 6 | TDD | |
| TDD configuration |  | 2, 5 | TDDConf.1.1 | |
| 3, 6 | TDDConf.2.1 | |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 | |
| 3, 6 | 40: NRB,c = 106 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | 1, 2, 3, 4, 5, 6 | OP.1 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 |  | 1, 4 | SMTC.2 | |
| 2, 3, 5, 6 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 | |
| 3, 6 | 30 | |
| b2-Threshold2NR | dBm/SCS | 1, 2, 4, 5 | -101 | |
| 3, 6 | -98 | |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS |  |
| EPRE ratio of PDSCH to PDSCH |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 | |
| 3, 6 | -95 | |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | TDL-C 300ns 100Hz | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

<<Unchanged sections skipped>>

#### A.8.4.2.5 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is not used

##### A.8.4.2.5.1 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 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 FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.5.1-1, A.8.4.2.5.1-2 and A.8.4.2.5.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.5.1-2 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.8.4.2.5.1-2 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 B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.5.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in non-DRX

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

Table A.8.4.2.5.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| Test 1 | Test 2 |
| E-UTRA RF Channel Number |  | 1, 2 | 1 | | One E-UTRA carrier frequency is used. |
| NR RF Channel Number |  | 1, 2 | 1 | | One FR2 NR carrier frequency is used. |
| Active cell |  | 1, 2 | E-UTRA cell 1 (PCell) | | E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2. |
| 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]. |
| b1-ThresholdNR | dBm | 1, 2 | Note 1 | | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [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 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | 2 | 3μs | | Synchronous cells. |
| T1 | s | 1, 2 | 10 | |  |
| T2 | s | 1, 2 | 6 | 3 |  |
| Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2.5.1-3 | | | | | |

Table A.8.4.2.5.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 2 | |
| T1 | T2 |
| AoA setup defined in A.3.15.2.1 | |  | 1, 2 | Setup 2a | |
| Assumption for UE beamsNote 5 | |  | 1, 2 | Rough | |
| NR RF Channel Number | |  | 1, 2 | 1 | |
| Duplex mode | |  | 1, 2 | TDD | |
| TDD configuration | |  | 1, 2 | TDDConf.3.1 | |
| BWchannel | | MHz | 1, 2 | 100: NRB,c = 24 | |
| OCNG patterns defined in A.3.2.1.3 | |  | 1, 2 | OP.3 | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | 1 | SMTC.2 | |
| 2 | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1, 2 | 120 | |
| b1-ThresholdNR | UE power class 3 | dBm/SCS | 1, 2 | -112 | |
| 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) | |  |
| Ês | | dBm/SCS | 1, 2 | -Infinity | -80.6 |
| SSB-RP Note 3 | | dBm/SCS | 1, 2 | -Infinity | -80.6 |
| BB Note 6 | | dB | 1, 2 | -Infinity | 8.3 |
| IoNote3 | | dBm/95.04MHz | 1, 2 | -Infinity | -56.0 |
| Propagation Condition | |  | 1, 2 | AWGN | |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: SSB-RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Void  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 6: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | |

##### A.8.4.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 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 B1 triggered measurement report, with a measurement reporting delay less than D2 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 not required to report SSB time index.

Table A.8.4.2.5.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

|  |  |  |
| --- | --- | --- |
| Test case | Measurement reporting delay (ms) | |
| Test 1: D1 ms | Test 2: D2 ms |
| UE power class 3 | 3200 | 1600 |

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.

<<End of change>>