**3GPP TSG-RAN WG4 Meeting # 104-eR4-221xxxx**

**Electronic Meeting, 15 - 26 August 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.104** | **CR** | **xxxx** | **rev** | **-** | **Current version:** | **17.6.0** |  |
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| *For* [***HELP***](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 |  | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Big CR to 38.133 for Rel-17 NR extension up to 71 GHz maintenance (Rel-17, CAT B) | | | | | | | | | |
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| ***Source to WG:*** | MCC, Qualcomm | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_ext\_to\_71GHz-Core, NR\_ext\_to\_71GHz-Core | | | | |  | ***Date:*** | | | 2022-08-30 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Big CR to incorporate all endorsed CRs at RAN4#104-e | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | R4-2213027 Draft CR on introduction of SSB configurations for FR2-2:  Define the SSB configuration for FR2-2 based on the WF R4-2210590  R4-2214971 Draft CR Measurement procedure updates for FR2-2 :  Text proposals related to FR2-2 beam sweeping and measurement procedure relaxations agreed in the revious RAN4 meetings  R4-2214982 Draft CR on beam sweeping factor for RRM requirements of FR2-2  Update the requirements of beam sweeping factor  R4-2214983 Draft CR on RSSI requirements of FR2-2  Define scheduling restriction on DL reception for RSSI measurement.  Add CO measurement requirements for FR2-2  R4-2214984 Draft CR on test cases of HO for FR2-2  Add test cases of handover for operation in FR2-2  R4-2214985 Draft CR on test cases of timing requirements for FR2-2  Add test cases of transmit timing and TA adjustment for operation in FR2-2  R4-2214986 Draft CR on test cases of BWP switch for FR2-2  Add following test cases of BWP switch for operation in FR2-2 :   * NR FR2-2- NR FR2-2 DL active BWP switch of SCell with non-DRX in SA * NR FR2-2 DL active BWP switch of PCell with non-DRX in SA * NR FR2-2 Active BWP switch on multiple SCells with non-DRX in SA   R4-2214997 Draft CR on introduction of intra-frequency and inter-frequency measurement test cases without CCA for FR2-2  Define the intra-frequency and inter-frequency measurement test cases without CCA for FR2-2  R4-2215046 Test Cases for cell re-selection for extending NR operation to 71GHz  Add test cases on test cases on cell re-selection for 71GHz  R4-2215047 Test Cases for Scell activation and deactivation for extending NR operation to 71GHz  Add test cases on test cases on Scell activation and deactivation for 71GHz  R4-2215104 Draft CR for timing requirements for FR2-2 – MRTD, MTTD  New definition for MTTD and MRTD for 480kHz and 960kHz SCS  MRTD and MTTD requirements for 480kHz and 960kHz SCS  R4-2215146 Draft CR on UE timing advance adjustment accuracy for Rel-17 NR extension to 71GHz  The timing Advance adjustment accuracy for 480/960kHz UL SCS are updated and brackets removed. Accordingly, the Editor’s note is removed | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Core and performance requirements are missing | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.1.1.4, 6.1.1.5, 6.2.1, 6.2.3, 7.3.1, 7.3.2, 7.5, 7.6, 8.1.2.2, 8.5.2.2, 8.5.5.2, 8.5.6.2, 8.9.2, 8.9B.2, 9.2.5, 9.2.6, 9.2A.7, 9.3.4 9.3.9, A.3.10.2  New Clauses : A.7.3.1.X1, A.7.3.1.X2, A.7.3.1.X3, A.7.4.1.X1, A.7.4.3.X1, A.7.5.6.1.X1, A.7.5.6.2.X1, A.7.5.6.5.X1, A.7.6X.1, A.7.6X.2, A.14.X.1, A.14.X.1, A.14.X.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

### < Start of change 1, R4-2214982>

#### 6.1.1.4 NR FR2- NR FR2 Handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR FR2 cell to NR FR2 cell.

##### 6.1.1.4.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within Dhandover ms from the end of the last TTI containing the RRC command.

Where:

Dhandover equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.4.2.

##### 6.1.1.4.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than Tinterrupt

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

Where:

Tsearch is the time required to search the target cell when the handover command is received by the UE. If the target cell is a known cell, then Tsearch = 0 ms. If the target cell is an unknown intra-frequency cell and the target cell Es/Iot≥-2 dB, then Tsearch = N\* Trs ms. If the target cell is an unknown inter-frequency cell and the target cell Es/Iot≥-2 dB, then Tsearch = N\*3\* Trs ms. N = 8 when the target cell is in FR2-1, and N = 12 when the target cell is in FR2-2. Regardless of whether DRX is in use by the UE, Tsearch shall still be based on non-DRX target cell search times.

Tprocessing is time for UE processing. Tprocessing can be up to 20ms.

Tmargin is time for SSB post-processing. Tmargin can be up to 2ms.

T∆ is time for fine time tracking and acquiring full timing information of the target cell. T∆ = Trs for both known and unknown target cell.

TIU is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. TIU can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

Trs is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If such measObjectNRs configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with Trs=5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2*prior to the handover command, Trs follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

In FR2, the target cell is known if it has been meeting the following conditions:

- During the last 5 seconds before the reception of the handover command:

- the UE has sent a valid measurement report for the target cell and

- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3,

- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

#### 6.1.1.5 NR FR1- NR FR2 Handover

The requirements in this clause are applicable to inter-frequency handovers from NR FR1 cell to NR FR2 cell.

##### 6.1.1.5.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within Dhandover ms from the end of the last TTI containing the RRC command.

Where:

Dhandover equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.5.2.

##### 6.1.1.5.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When in inter-frequency handover is commanded, the interruption time shall be less than Tinterrupt

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

Where:

Tsearch is the time required to search the target cell when the handover command is received by the UE. If the target cell is a known cell, then Tsearch = 0 ms. If the target cell is an unknown inter-frequency cell and the target cell Es/Iot≥-2 dB, then Tsearch = N\*3\* Trs ms. N = 8 when the target cell is in FR2-1, and N = 12 when the target cell is in FR2-2. Regardless of whether DRX is in use by the UE, Tsearch shall still be based on non-DRX target cell search times.

Tprocessing is time for UE processing. Tprocessing can be up 40ms.

Tmargin is time for SSB post-processing. Tmargin can be up to 2ms.

T∆ is time for fine time tracking and acquiring full timing information of the target cell. T∆ = Trs for both known and unknown target cell.

TIU is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. TIU can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

Trs is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If such measObjectNRs configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with Trs=5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms.

In FR2, the target cell is known if it has been meeting the following conditions:

- During the last 5 seconds before the reception of the handover command:

- the UE has sent a valid measurement report for the target cell and

- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3,

- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

### < End of change 1, R4-2214982>

### < Start of change 2, R4-2214982>

### 6.2.1 SA: RRC Re-establishment

#### 6.2.1.1 Introduction

This clause contains requirements on the UE regarding RRC connection re-establishment procedure. RRC connection re-establishment is initiated when a UE in RRC\_CONNECTED state on the carrier without CCA or on the carrier with CCA loses RRC connection due to any of failure cases, including radio link failure, handover failure, and RRC connection reconfiguration failure. The RRC connection re-establishment procedure is specified in clause 5.3.7 of TS 38.331 [2].

The requirements in this clause are applicable for RRC connection re-establishment to NR cell.

#### 6.2.1.2 Requirements

In RRC\_CONNECTED state the UE shall be capable of sending *RRCReestablishmentRequest* message within Tre-establish\_delay seconds from the moment it detects a loss in RRC connection. The total RRC connection delay (Tre-establish\_delay) shall be less than:

TUL\_grant: It is the time required to acquire and process uplink grant from the target PCell. The uplink grant is required to transmit *RRCReestablishmentRequest* message.

The UE re-establishment delay (TUE\_re-establish\_delay) is specified in clause 6.2.1.2.1.

##### 6.2.1.2.1 UE Re-establishment delay requirement

The UE re-establishment delay (TUE\_re-establish\_delay) is the 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. The UE re-establishment delay (TUE\_re-establish\_delay) requirement shall be less than:

The intra-frequency target NR cell shall be considered detectable if each relevant SSB can satisfy that:

- SS-RSRP related side conditions given in clause 10.1.2 and 10.1.3 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and

- the conditions of SSB\_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding NR Band are fulfilled.

The inter-frequency target NR cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clause 10.1.4 and 10.1.5 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and

- the conditions of SSB\_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding NR Band are fulfilled.

Tidentify\_intra\_NR: It is the time to identify the target intra-frequency NR cell and it depends on whether the target NR cell is known cell or unknown cell and on the FR of the target NR cell. If the UE is not configured with intra-frequency NR carrier for RRC re-establishment then Tidentify\_intra\_NR=0; otherwise Tidentify\_intra\_NR shall not exceed the values defined in Table 6.2.1.2.1-1 when *[highSpeedMeasFlagFR2]* is not configured or UE is not capable of FR2 power class 6 and Table 6.2.1.2.1-3 when *[highSpeedMeasFlagFR2]* is configured and UE is capable of FR2 power class 6.

Tidentify\_inter\_NR,i: It is the time to identify the target inter-frequency NR cell on inter-frequency carrier *i* configured for RRC re-establishment and it depends on whether the target NR cell is known cell or unknown cell and on the FR of the target NR cell. Tidentify\_inter\_NR,i shall not exceed the values defined in Table 6.2.1.2.1-2.

TSMTC: It is the periodicity of the SMTC occasion configured for the intra-frequency carrier. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2*, Tsmtc follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

TSMTC,i: It is the periodicity of the SMTC occasion configured for the inter-frequency carrier *i*. If it is not configured, the UE may assume that the target SSB periodicity is no larger than 20 ms.

TSI-NR: It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 38.331 [2] for the target NR cell.

TPRACH: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. TPRACH can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

Nfreq: It is the total number of NR frequencies to be monitored for RRC re-establishment; Nfreq = 1 if the target intra-frequency NR cell is known, else Nfreq = 2 and Tidentify\_intra\_NR = 0 if the target inter-frequency NR cell is known.

There is no requirement if the target cell does not contain the UE context.

In the requirement defined in the below tables, the target FR1 cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown.

Table 6.2.1.2.1-1: Time to identify target NR cell for RRC connection re-establishment to NR intra-frequency cell

|  |  |  |  |
| --- | --- | --- | --- |
| Serving cell | FR of target NR | Tidentify\_intra\_NR [ms] | |
| SSB Ês/Iot (dB) | cell | Known NR cell | Unknown NR cell |
| ≥ -8 | FR1 | MAX (200 ms, 5 x TSMTC) | MAX (800 ms, 10 x TSMTC) |
| ≥ -8 | FR2-1 | N/A | MAX (1000 ms, 80 x TSMTC)) |
| ≥ -8 | FR2-2 | N/A | MAX (1000 ms, 120 x TSMTC)) |
| < -8 | FR1 | N/A | 800Note1 |
| < -8 | FR2-1 | N/A | 3520Note1 |
| < -8 | FR2-2 | N/A | 5280Note1 |
| Note 1: The UE is not required to successfullyidentify a cell on any NR frequency layer when TSMTC > 20 ms and serving cell SSB Ês/Iot < -8 dB. | | | |

Table 6.2.1.2.1-2: Time to identify target NR cell for RRC connection re-establishment to NR inter-frequency cell

|  |  |  |  |
| --- | --- | --- | --- |
| Serving cell SSB Ês/Iot (dB) | FR of target NR cell | Tidentify\_inter\_NR, i [ms] | |
|  |  | Known NR cell | Unknown NR cell |
| ≥ -8 | FR1 | MAX (200 ms, 6 x TSMTC, i) | MAX (800 ms, 13 x TSMTC, i) |
| ≥ -8 | FR2-1 | N/A | MAX (1000 ms, 104 x TSMTC, i)) |
| ≥ -8 | FR2-2 | N/A | MAX (1000 ms, 156 x TSMTC, i)) |
| < -8 | FR1 | N/A | 800Note1 |
| < -8 | FR2-1 | N/A | 4000Note1 |
| < -8 | FR2-2 | N/A | 6000 Note1 |
| Note 1: The UE is not required to successfully identify a cell on any NR frequency layer when TSMTC,i > 20 ms and serving cell SSB Ês/Iot < -8 dB. | | | |

Table 6.2.1.2.1-3: Time to identify target NR cell for RRC connection re-establishment to NR intra-frequency cell When *[highSpeedMeasFlagFR2]* is configured (Frequency range FR2)

|  |  |  |  |
| --- | --- | --- | --- |
| Serving cell | FR of target NR | Tidentify\_intra\_NR [ms] | |
| SSB Ês/Iot (dB) | cell | Known NR cell | Unknown NR cell |
| ≥ -8 | FR2 | N/A | MAX (1000 ms, 10 xN2 x TSMTC)) |
|  |  |  |  |
| Note 1: The UE is not required to successfullyidentify a cell on any NR frequency layer when TSMTC > 20 ms and serving cell SSB Ês/Iot < -8 dB.  Note 2: When SMTC <= 40ms, N2=2 when *[highSpeedMeasFlagFR2]* = [set1]; N2=6 when *[highSpeedMeasFlagFR2]* = [set2]. | | | |

### < End of change 2, R4-2214982>

### < Start of change 3, R4-2214982>

### 6.2.3 SA: RRC Connection Release with Redirection

#### 6.2.3.1 Introduction

This clause contains requirements on the UE regarding RRC connection release with redirection procedure. RRC connection release with redirection is initiated by the *RRCRelease* message with redirection to E-UTRAN or NR from NR specified in TS 38.331 [2]. The RRC connection release with redirection procedure is specified in clause 5.3.8 of TS 38.331 [2].

In the requirements of clause 6.2.3.2, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the first two successive candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding identification period; otherwise the SMTC occasion is considered as available at the UE.

In the requirements of clause 6.2.3.2, the term PRACH occasion unavailable for transmission refers to when the PRACH occasion is configured by gNB but not transmitted by the UE during the corresponding period due to UL CCA failure at the UE.

#### 6.2.3.2 Requirements

##### 6.2.3.2.1 RRC connection release with redirection to NR

The UE shall be capable of performing the RRC connection release with redirection to the target NR cell within Tconnection\_release\_redirect\_NR.

The time delay (Tconnection\_release\_redirect\_NR) is the time between the end of the last slot containing the RRC command, “*RRCRelease*” (TS 38.331 [2]) on the NR PDSCH and the time the UE starts to send random access to the target NR cell. The time delay (Tconnection\_release\_redirect\_NR) shall be less than:

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

The target NR cell shall be considered detetable when for each relevant SSB, the side conditions should be met that,

- the conditions of SSB\_RP and SSB Ês/Iot according to Annex B.2.5 for a corresponding NR Band are fulfilled.

TRRC\_procedure\_delay: It is the RRC procedure delay for processing the received message “*RRCRelease*” as defined in clause 6.2.2 of TS 38.331 [2].

Tidentify-NR: It is the time to identify the target NR cell and depends on the FR of the target NR cell. It is defined in Table 6.2.3.2.1-1. Note that Tidentify-NR = TPSS/SSS-sync + Tmeas, in which TPSS/SSS-sync is the cell search time and Tmeas is the measurement time due to cell selection criteria evaluation.

TSI-NR: It is the time required for acquiring all the relevant system information of the target NR cell. This time depends upon whether the UE is provided with the relevant system information of the target NR cell or not by the old NR cell before the RRC connection is released. TRACH: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. TRACH can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

Trs is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the redirection command, otherwise Trs is the SMTC periodicity configured in the *measObjectNR* having the same SSB frequency and subcarrier spacing configured for the RRC connection release with redirection. If the measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided with SMTC configuration or measurement object for the frequency which is also configured for the RRC connection release with redirection then:

- the requirement in this clause is applied with Trs = 20 ms if the SSB transmission periodicity is not larger than 20 ms; otherwise,

- there is no requirement if the SSB transmission periodicity is larger than 20ms.

Table 6.2.3.2.1-1: Time to identify target NR cell for RRC connection release with redirection to NR

|  |  |
| --- | --- |
| FR of target NR cell | Tidentify-NR |
| FR1 | MAX (680 ms, 11 x Trs) |
| FR2-1 | MAX (880 ms, 8x11 x Trs) |
| FR2-2 | MAX (880 ms, 12x11 x Trs) |
| Note: If the UE has been provided with higher layer signaling of *smtc2*specified in TS 38.331 [2] prior to the redirection command, Trs follows *smtc1* or *smtc2* according to the physical cell ID of the target cell. | |

### < End of change 3, R4-2214982>

### < Start of change 4, R4-2215146>

### 7.3.1 Introduction

The timing advance is initiated from gNB to UE in EN-DC, NR-DC, NE-DC and NR SA operation modes, with MAC message that implies the adjustment of the timing advance, as defined in clause 5.2 of TS 38.321 [7].

### 7.3.2 Requirements

#### 7.3.2.1 Timing Advance adjustment delay

UE shall adjust the timing of its uplink transmission timing at time slot *n*+ *k+1* for a timing advance command received in time slot *n*, and the value of *k* is defined in clause 4.2 in TS 38.213 [3]. The same requirement applies also when the UE is not able to transmit a configured uplink transmission due to the channel assessment procedure.

#### 7.3.2.2 Timing Advance adjustment accuracy

The UE shall adjust the timing of its transmissions with a relative accuracy better than or equal to the UE Timing Advance adjustment accuracy requirement in Table 7.3.2.2-1, to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command step is defined in TS 38.213 [3].

Table 7.3.2.2-1: UE Timing Advance adjustment accuracy

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| UL Sub Carrier Spacing(kHz) | 15 | 30 | 60 | 120 | 480 | 960 |
| UE Timing Advance adjustment accuracy | ±256 Tc | ±256 Tc | ±128 Tc | ±32 Tc | ±10 Tc | ±6 Tc |

### < End of change 4, R4-2215146>

### < Start of change 5, R4-2215104>

## 7.5 Maximum Transmission Timing Difference

### 7.5.1 Introduction

A UE shall be capable of handling a relative transmission timing difference between subframe timing boundary of E-UTRA PCell and the closest slot timing boundary of PSCell to be aggregated for EN-DC operation.

A UE shall be capable of handling a relative transmission timing difference among the closest slot timing boundaries of different carriers in FR1 and/or FR2-1 to be aggregated in NR carrier aggregation.

A UE shall be capable of handling a relative transmission timing difference among the closest subframe timing boundaries of different carriers to be aggregated in FR1 and FR2-2 NR inter-band carrier aggregation.

A UE shall be capable of handling a relative transmission timing difference between slot timing boundary of PCell and subframe timing boundary of E-UTRA PSCell to be aggregated for NE-DC operation.

A UE shall be capable of handling a relative transmission timing difference between slot timing boundaries of PCell in FR1 or FR2-1 and the closest slot timing boundary of PSCell in FR1 or FR2-1 to be aggregated in NR DC operation.

A UE shall be capable of handling a relative transmission timing difference between subframe timing boundaries of PCell in FR1 and the closest subframe timing boundary of PSCell in FR2-2 to be aggregated in NR DC operation.

### 7.5.2 Minimum Requirements for inter-band EN-DC

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-1.

Table 7.5.2-1 Maximum uplink transmission timing difference requirement for asynchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing in E-UTRA PCell (kHz) | UL Sub-carrier spacing for data in PSCell (kHz) | Maximum uplink transmission timing difference (µs) |
| 15 | 15 | 500 |
| 15 | 30 | 250 |
| 15 | 60 | 125 |
| 15 | 120Note1 | 62.5 |
| NOTE 1: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the requirement is defined in clause 7.5.3 and this Table 7.5.2-1 is also applicable, the scenario with 120kHz PSCell does not exist. | | |

Table 7.5.2-2 Void

#### 7.5.2.1 Minimum Requirements for inter-band synchronous EN-DC

The requirements in this clause apply as a reference for inter-band synchronous EN-DC.

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell for inter-band synchronous EN-DC as shown in Table 7.5.2.1-1 1. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD, E-UTRA FDD-NR FDD, E-UTRA TDD-NR FDD and E-UTRA FDD-NR TDD inter-band EN-DC.

Table 7.5.2.1-1 Maximum uplink transmission timing difference requirement for inter-band synchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing in E-UTRA PCell (kHz) | UL Sub-carrier spacing for data in PSCell (kHz) | Maximum uplink transmission timing difference (µs) |
| 15 | 15 | 35.21 |
| 15 | 30 | 35.21 |
| 15 | 60 | 35.21 |
| 15 | 120 | 35.21 |

### 7.5.3 Minimum Requirements for intra-band EN-DC

For intra-band EN-DC, only co-located deployment is applied.

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-1 for E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation [2].

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.3-1 for E-UTRA TDD-NR TDD and E-UTRA FDD-NR FDD intra-band EN-DC provided the UE does not indicate that it is capable of asynchronous FDD-FDD EN-DC operation [16].

Table 7.5.3-1: Maximum uplink transmission timing difference requirement for intra-band synchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing in E-UTRA PCell (kHz) | UL Sub-carrier spacing for data in PSCell (kHz) | Maximum uplink transmission timing difference (µs) |
| 15 | 15 | 5.21Note1,Note 2 |
| 15 | 30 | 5.21Note 2 |
| 15 | 60 | 5.21 Note 2 |
| NOTE 1: This is not applicable for a UE which indicates the capability of only supporting single UL timing (*ul-TimingAlignmentEUTRA-NR* is signalled). Single UL timing for E-UTRA and NR cell is assumed for this UE.  NOTE 2: If the transmission timing difference exceeds the cyclic prefix length of the UL Sub-carrier spacing for data in PSCell, NR UE Tx EVM degradation is expected for the symbol that is overlapping the LTE subframe boundary | | |

### 7.5.4 Minimum Requirements for NR Carrier Aggregation

The UE shall be capable of handling at least a relative transmission timing difference between slot timing of all pairs of TAGs in FR1 and/or FR2-1 as shown in Table 7.5.4-1, provided that the UE is:

- configured with the pTAG and the sTAG for inter-band NR carrier aggregation in SA or NR-DC mode, or

- configured with more than one sTAG for inter-band NR carrier aggregation in EN-DC or NE-DC mode.

The UE shall be capable of handling at least a relative transmission timing difference between subframe timing of all pairs of TAGs between FR1 and FR2-2 as shown in Table 7.5.4-1, provided that the UE is:

- configured with the pTAG and the sTAG for inter-band NR carrier aggregation in SA or NR-DC mode.

Table 7.5.4-1: Maximum uplink transmission timing difference requirement for inter-band NR carrier aggregation

|  |  |
| --- | --- |
| Frequency Range of the pair of TAGs | Maximum uplink transmission timing difference (µs) |
| FR1 | 34.6 |
| FR2-1 | 8.5 Note1 |
| Between FR1 and FR2-1 | 26.1 |
| Between FR1 and FR2-2 | 26.1 |
| Note1: This requirement applies to the UE capable of independent beam management for FR2-1 inter-band CA. | |

### 7.5.5 Minimum Requirements for inter-band NE-DC

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and E-UTRA PSCell as shown in Table 7.5.5-1 for inter-band asynchronous NE-DC.

Table 7.5.5-1: Maximum uplink transmission timing difference requirement for inter-band asynchronous NE-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing in PCell (kHz) | UL Sub-carrier spacing for data in E-UTRA PSCell (kHz) | Maximum uplink transmission timing difference (µs) |
| 15 | 15 | 500 |
| 30 | 15 | 250 |
| 60 | 15 | 125 |
| 120 | 15 | 62.5 |
| NOTE 1: Void | | |

Table 7.5.5-2 Void

#### 7.5.5.1 Minimum Requirements for inter-band synchronous NE-DC

The requirements in this clause apply as a reference for inter-band synchronous NE-DC.

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and E-UTRA PSCell for inter-band synchronous NE-DC as shown in Table 7.5.5.1-1. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.5.5.1-1: Maximum uplink transmission timing difference requirement for inter-band synchronous NE-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing in PCell (kHz) | UL Sub-carrier spacing for data in E-UTRA PSCell (kHz) | Maximum uplink transmission timing difference (µs) |
| 15 | 15 | 35.21 |
| 30 | 15 | 35.21 |
| 60 | 15 | 35.21 |
| 120 | 15 | 35.21 |

### 7.5.6 Minimum Requirements for inter-band NR DC

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and PSCell as shown in Table 7.5.6-1 provided that the UE indicates that it is capable of synchronous NR DC only [14].

Table 7.5.6-1: Maximum uplink transmission timing difference requirement for inter-band synchronous NR DC

|  |  |  |
| --- | --- | --- |
| Frequency Range | | Maximum uplink transmission timing difference (µs) |
| Cell in MCG | Cell in SCG |  |
| FR1 | FR1 | 34.6 |
| FR2-1 | FR2-1 | 8.5 |
| FR1 | FR2-1 | 34.1 |
| FR1 | FR2-2 | 34.1 |

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and PSCell as shown in Table 7.5.6-2 provided that the UE indicates that it is capable of asynchronous NR DC [14].

Table 7.5.6-2 Maximum uplink transmission timing difference requirement for inter-band asynchronous NR DC

|  |  |
| --- | --- |
| Max {Sub-carrier spacing in PCell (kHz), Sub-carrier spacing in PSCell (kHz)} | Maximum uplink transmission timing difference (µs) |
| 15 | 500 |
| 30 | 250 |
| 60 | 125 |
| 120 | 62.5 |
| 480 | 15.625 |
| 960 | 7.8125 |

### < End of change 5, R4-2215104>

### < Start of change 6, R4-2215104>

## 7.6 Maximum Receive Timing Difference

### 7.6.1 Introduction

A UE shall be capable of handling a relative receive timing difference between subframe timing boundary of an E-UTRA cell belonging to the MCG and the closest slot timing boundary of a cell belonging to SCG to be aggregated for EN-DC operation.

A UE shall be capable of handling a relative receive timing difference between subframe timing boundary of an E-UTRA cell belonging to the SCG to be aggregated for NE-DC operation and the closest slot timing boundary of a cell belonging to MCG.

A UE shall be capable of handling a relative receive timing difference between slot timing boundary of a cell belonging to MCG in FR1 or FR2-1 and the closest slot timing boundary of a cell belonging to the SCG FR1 or FR2-1 to be aggregated for NR DC operation.

A UE shall be capable of handling a relative receive timing difference between subframe timing boundary of a cell belonging to MCG in FR1 and the closest subframe timing boundary of a cell belonging to the SCG in FR2-2 to be aggregated for NR DC operation.

A UE shall be capable of handling a relative receive timing difference among the closest slot timing boundaries of different carriers in FR1 and/or FR2-1 to be aggregated in NR carrier aggregation.

A UE shall be capable of handling a relative receive timing difference among the closest subframe timing boundaries of different carriers to be aggregated in FR1 and FR2-2 NR inter-band carrier aggregation.

The requirements defined in clause 7.6 are also applicable when UE is configured to receive multiple PDSCH transmission occasions from one or more QCL sources on any one of the aggregated NR carriers.

### 7.6.2 Minimum Requirements for inter-band EN-DC

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to SCG at the UE receiver as shown in Table 7.6.2-1.

Table 7.6.2-1: Maximum receive timing difference requirement for asynchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing of E-UTRA cell in MCG (kHz) | DL Sub-carrier spacing of cell in SCG (kHz) (Note 1) | Maximum receive timing difference (µs) |
| 15 | 15 | 500 |
| 15 | 30 | 250 |
| 15 | 60 | 125 |
| 15 | 120Note2 | 62.5 |
| NOTE 1: DL Sub-carrier spacing is min{SCSSS, SCSDATA}.  NOTE 2: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the requirement is defined in clause 7.6.3 and this Table 7.6.2-1 is also applicable, the scenario with 120 kHz does not exit. | | |

Table 7.6.2-2 Void

Table 7.6.2-3 Void

#### 7.6.2.1 Minimum Requirements for inter-band synchronous EN-DC

The requirements in this clause apply as a reference for inter-band synchronous EN-DC.

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from an E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to SCG at the UE receiver for inter-band synchronous EN-DC as shown in Table 7.6.2.1-1. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD, E-UTRA FDD-NR FDD, E-UTRA TDD-NR FDD and E-UTRA FDD-NR TDD inter-band EN-DC.

Table 7.6.2.1-1: Maximum receive timing difference requirement for inter-band synchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing of E-UTRA cell in MCG (kHz) | DL Sub-carrier spacing of cell in SCG (kHz) (Note1) | Maximum receive timing difference (µs) |
| 15 | 15 | 33 |
| 15 | 30 |  |
| 15 | 60 |  |
| 15 | 120 |  |
| Note 1: DL Sub-carrier spacing is min{SCSSS, SCSDATA}. | | |

### 7.6.3 Minimum Requirements for intra-band EN-DC

For intra-band EN-DC, only co-located deployment is applied.

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG as shown in Table 7.6.2-1 for E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation [2].

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG as shown in Table 7.6.3-1 for E-UTRA FDD-NR FDD and E-UTRA TDD-NR TDD intra-band EN-DC provided the UE does not indicate that it is capable of asynchronous FDD-FDD EN-DC operation [16].

Table 7.6.3-1 Maximum receive timing difference requirement for intra-band synchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing of E-UTRA cell in MCG (kHz) | DL Sub-carrier spacing of cell in SCG (kHz) Note1 | Maximum receive timing difference (µs) |
| 15 | 15 | 3 |
| 15 | 30 | 3 |
| 15 | 60 | 3 |
| NOTE 1: DL Sub-carrier spacing is min{SCSSS, SCSDATA}. | | |

Table 7.6.3-2: Void

### 7.6.4 Minimum Requirements for NR Carrier Aggregation

For intra-band CA, only co-located deployment is applied. For intra-band non-contiguous NR carrier aggregation, the UE shall be capable of handling at least a relative receive timing difference between slot timing of different carriers to be aggregated at the UE receiver as shown in Table 7.6.4-1 below.

Table 7.6.4-1: Maximum receive timing difference requirement for intra-band non-contiguous NR carrier aggregation

|  |  |
| --- | --- |
| Frequency Range | Maximum receive timing difference (µs) |
| FR1 | 31 |
| FR2-1 | 0.26 |
| Note 1: In the case of different SCS on different CCs, if the receive time difference exceeds the cyclic prefix length of that SCS, demodulation performance degradation is expected for the first symbol of the slot. | |

For inter-band NR carrier aggregation,

* the UE shall be capable of handling at least a relative receive timing difference between slot timing of all pairs of carriers in FR1 and FR2-1 to be aggregated at the UE receiver as shown in Table 7.6.4-2 below.
* the UE shall be capable of handling at least a relative receive timing difference between subframe timing of all pairs of carriers in FR1 and FR2-2 to be aggregated at the UE receiver as shown in Table 7.6.4-2 below.

Table 7.6.4-2: Maximum receive timing difference requirement for inter-band NR carrier aggregation

|  |  |
| --- | --- |
| Frequency Range of the pair of carriers | Maximum receive timing difference (µs) |
| FR1 | 33 |
| FR2-1 | 8 note1 |
| Between FR1 and FR2-1 | 25 |
| Between FR1 and FR2-2 | 25 |
| Note1: This requirement applies to the UE capable of independent beam management for FR2-1 inter-band CA. | |

### 7.6.5 Minimum Requirements for inter-band NE-DC

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from an E-UTRA cell belonging to the SCG at the UE receiver for asynchronous NE-DC as shown in Table 7.6.5-1.

Table 7.6.5-1: Maximum receive timing difference requirement for asynchronous NE-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing of cell in MCG (kHz) | DL Sub-carrier spacing of EUTRA cell in SCG (kHz) (Note 1) | Maximum receive timing difference (µs) |
| 15 | 15 | 500 |
| 30 | 15 | 250 |
| 60 | 15 | 125 |
| 120 | 15 | 62.5 |
| NOTE 1: DL Sub-carrier spacing is min{SCSSS, SCSDATA}.  NOTE 2: Void | | |

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from a E-UTRA cell belonging to the SCG at the UE receiver for inter-band synchronous NE-DC as shown in Table 7.6.5-2. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.6.5-2: Void

#### 7.6.5.1 Minimum Requirements for inter-band synchronous NE-DC

The requirements in this clause apply as a reference for inter-band synchronous NE-DC.

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from a E-UTRA cell belonging to the SCG at the UE receiver for inter-band synchronous NE-DC as shown in Table 7.6.5.1-1. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.6.5.1-1: Maximum receive timing difference requirement for inter-band synchronous NE-DC

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing of cell in MCG (kHz) | DL Sub-carrier spacing of EUTRA cell in SCG (kHz) (Note1) | Maximum receive timing difference (µs) |
| 15 | 15 | 33 |
| 30 | 15 |  |
| 60 | 15 |  |
| 120 | 15 |  |

### 7.6.6 Minimum Requirements for inter-band NR DC

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG in FR1 or FR2-1 and slot timing of signal from a cell belonging to the SCG in FR1 or FR2-1 at the UE receiver as shown in Table 7.6.6-1 provided that the UE indicates that it is capable of synchronous NR DC only [16].

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a cell belonging to the MCG in FR1 and subframe timing of signal from a cell belonging to the SCG in FR2-2 at the UE receiver as shown in Table 7.6.6-1 provided that the UE indicates that it is capable of synchronous NR DC only [16].

Table 7.6.6-1: Maximum receive timing difference requirement for inter-band synchronous NR DC

|  |  |  |
| --- | --- | --- |
| Frequency Range | | Maximum receive timing difference (µs) |
| Cell in MCG | Cell in SCG |  |
| FR1 | FR1 | 33 |
| FR2-1 | FR2-1 | 8 |
| FR1 | FR2-1 | 33 |
| FR1 | FR2-2 | 33 |

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG in FR1 or FR2-1 and slot timing of signal from a cell belonging to the SCG in FR1 or FR2-1 at the UE receiver as shown in Table 7.6.6-2 provided that the UE indicates that it is capable of asynchronous NR DC [16].

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a cell belonging to the MCG in FR1 and subframe timing of signal from a cell belonging to the SCG in FR2-2 at the UE receiver as shown in Table 7.6.6-2 provided that the UE indicates that it is capable of asynchronous NR DC [16].

Table 7.6.6-2 Maximum receive timing difference requirement for inter-band asynchronous NR DC

|  |  |
| --- | --- |
| Max {Sub-carrier spacing in PCell (kHz), Sub-carrier spacing in PSCell (kHz)} | Maximum receive timing difference (µs) |
| 15 | 500 |
| 30 | 250 |
| 60 | 125 |
| 120 | 62.5 |
| 480 | 15.625 |
| 960 | 7.8125 |

### < End of change 6, R4-2215104>

### < Start of change 7, R4-2214982>

#### 8.1.2.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last TEvaluate\_out\_SSB [ms] period becomes worse than the threshold Qout\_SSB within TEvaluate\_out\_SSB [ms] evaluation period.

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last TEvaluate\_in\_SSB [ms] period becomes better than the threshold Qin\_SSB within TEvaluate\_in\_SSB [ms] evaluation period.

TEvaluate\_out\_SSB and TEvaluate\_in\_SSB are defined in Table 8.1.2.2-1 for FR1.

TEvaluate\_out\_SSB and TEvaluate\_in\_SSB are defined in Table 8.1.2.2-2 for FR2 with scaling factor N=8 for FR2-1 and N=12 for FR2-2, for FR2 power classes other than power class 6 or for FR2 class 6 when *highSpeedMeasFlagFR2-r17* is not configured

TEvaluate\_out\_SSB and TEvaluate\_in\_SSB are defined in Table 8.1.2.2-3 for FR2 power class 6 UE configured with *highSpeedMeasFlagFR2-r17*.

TEvaluate\_out\_SSB and TEvaluate\_in\_SSB are defined in Table 8.1.2.2-4 for FR1 (deactivated PSCell).

TEvaluate\_out\_SSB and TEvaluate\_in\_SSB are defined in Table 8.1.2.2-5 for FR2 (deactivated PSCell) with scaling factor N=8 for FR2-1 and N=12 for FR2-2.

### < End of change 7, R4-2214982>

### < Start of change 8, R4-2214982>

#### 8.5.2.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured SSB resource in set  estimated over the last TEvaluate\_BFD\_SSB ms period becomes worse than the threshold Qout\_LR\_SSB within TEvaluate\_BFD\_SSB ms period.

The value of TEvaluate\_BFD\_SSB is defined in Table 8.5.2.2-1 or Table 8.5.2.2-4 (deactivated PSCell) for FR1.

The value of TEvaluate\_BFD\_SSB is defined in Table 8.5.2.2-2 or Table 8.5.2.2-5 (deactivated PSCell) for FR2 with scaling factor N=8 for FR2-1 and N=12 for FR2-2, for FR2 power classes other than power class 6 or for FR2 class 6 when *highSpeedMeasFlagFR2-r17* is not configured.

The value of TEvaluate\_BFD\_SSB is defined in Table 8.5.2.2-3 for FR2 power class 6 UE configured with *highSpeedMeasFlagFR2-r17*.

### < End of change 8, R4-2214982>

### < Start of change 9, R4-2214982>

#### 8.5.5.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured SSB resource in set  estimated over the last TEvaluate\_CBD\_SSB ms period becomes better than the threshold Qin\_LR provided SSB\_RP and SSB Ês/Iot are according to Annex Table B.2.4.1 for a corresponding band.

The UE shall monitor the configured SSB resources using the evaluation period in table 8.5.5.2-1 and 8.5.5.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320ms.

The value of TEvaluate\_CBD\_SSB is defined in Table 8.5.5.2-1 for FR1.

The value of TEvaluate\_CBD\_SSB is defined in Table 8.5.5.2-2 for FR2 with scaling factor N=8 for FR2-1 and N=12 for FR2-2.

### < End of change 9, R4-2214982>

### < Start of change 10, R4-2214982>

#### 8.5.6.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in set  estimated over the last TEvaluate\_CBD\_CSI-RS [ms] period becomes better than the threshold Qin\_LR within TEvaluate\_CBD\_CSI-RS [ms] period provided CSI-RS Ês/Iot is according to Annex Table B.2.4.2 for a corresponding band.

The UE shall monitor the configured CSI-RS resources using the evaluation period in table 8.5.6.2-1 and 8.5.6.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320ms.

The value of TEvaluate\_CBD\_CSI-RS is defined in Table 8.5.6.2-1 for FR1.

The value of TEvaluate\_CBD\_CSI-RS is defined in Table 8.5.6.2-2 for FR2 with scaling factor N=8 for FR2-1 and N=12 for FR2-2.

### < End of change 10, R4-2214982>

### < Start of change 11, R4-2214982>

### 8.9.2 PSCell Addition Delay Requirement

The requirements in this clause shall apply for the UE configured with only PCell in FR1.

Upon receiving PSCell addition in subframe *n*, the UE shall be capable to transmit PRACH preamble towards PSCell in FR2 no later than in subframe *n* + Tconfig\_PSCell Upon receiving PSCell addition in subframe *n*, the UE shall be capable to transmit PRACH preamble towards PSCell in FR2 no later than in slot :

where:

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

TRRC\_delay is the RRC procedure delay as specified in TS 38.331 [2].

Tprocessing is the SW processing time needed by UE, including RF warm up period. Tprocessing = 40 ms.

Tsearch is the time for AGC settling and PSS/SSS detection. If the target cell is known, Tsearch = 0 ms. If the target cell is unknown and the target cell Ês/Iot ≥ -2dB, Tsearch = 3\*N\* Trs ms. N = 8 when the target cell is in FR2-1, and N = 12 when the target cell is in FR2-2

### < End of change 11, R4-2214982>

### < Start of change 12, R4-2214982>

### 8.9B.2 PSCell Addition Delay Requirement

The requirements in this clause shall apply for the UE configured with only PCell in FR1.

Upon receiving PSCell addition in subframe *n*, the UE shall be capable to transmit PRACH preamble towards PSCell in FR2-2 no later than in slot :

where:

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

TRRC\_delay is the RRC procedure delay as specified in TS 38.331 [2].

Tprocessing is the SW processing time needed by UE, including RF warm up period. Tprocessing = 40 ms.

Tsearch\_CCA is the time for AGC settling and PSS/SSS detection. If the target cell is known, Tsearch = 0 ms. If the target cell is unknown and the target cell Ês/Iot ≥ -2dB, Tsearch = (3\*N+L1\*N) \* Trs ms, where L1 is the number of SMTC occasions groups with at least one SSB/SMTC occasion in the group is not transmitted by the gNB during the AGC settling and PSS/SSS detection. L1, max=TBD, N is the Rx beam sweeping factor for FR2-2.

### < End of change 12, R4-2214982>

### < Start of change 13, R4-2214971>

### 9.2.5 Intrafrequency measurements without measurement gaps

#### 9.2.5.1 Intrafrequency cell identification

The UE shall be able to identify a new detectable intra-frequency cell within Tidentify\_intra\_without\_index if the UE is not indicated to report SSB based RRM measurement result with the associated SSB index(*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured), or the UE is indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_with\_index. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within Tidentify\_intra\_without\_index. It is assumed that *deriveSSB-IndexFromCell* is always enabled for FR1 TDD and FR2 with SCS smaller or equal to 480 kHz.

Tidentify\_intra\_without\_index = (TPSS/SSS\_sync\_intra + T SSB\_measurement\_period\_intra) ms

Tidentify\_intra\_with\_index = (TPSS/SSS\_sync\_intra + T SSB\_measurement\_period\_intra + TSSB\_time\_index\_intra) ms

Where:

TPSS/SSS\_sync\_intra: it is the time period used in PSS/SSS detection given in table 9.2.5.1-1, 9.2.5.1-2, 9.2.5.1-4 (deactivated SCell) or 9.2.5.1-5 (deactivated SCell) or 9.2.5.1-9 (deactivated SCell) or 9.2.5.1-11 or 9.2.5.1-12 (deactivated PSCell) or 9.2.5.1-13 (deactivated PSCell).

- For UE supporting power class 6 with *highSpeedMeasFlagFR2-r17* configured, if SMTC <= 40ms, TPSS/SSS\_sync\_intra is given in Table 9.2.5.1-11; [otherwise, TPSS/SSS\_sync\_intra is given in Table 9.2.5.1-2.]

TSSB\_time\_index\_intra: it is the time period used to acquire the index of the SSB being measured given in table 9.2.5.1-3, 9.2.5.1-15 (FR2-2), 9.2.5.1-6 (deactivated SCell), 9.2.5.1-10(deactivated SCell) or 9.2.5.1-14 (deactivated PSCell).

T SSB\_measurement\_period\_intra: equal to a measurement period of SSB based measurement given in table 9.2.5.2-1, table 9.2.5.2-2 table 9.2.5.2-3 (deactivated SCell), 9.2.5.2-4(deactivated SCell), 9.2.5.2-5 or 9.2.5.2-6(deactivated SCell), 9.2.5.2-8(deactivated PSCell) or 9.2.5.2-9(deactivated PSCell).

- For UE supporting power class 6 with *highSpeedMeasFlagFR2-r17* configured, if SMTC <= 40ms, TSSB\_measurement\_period\_intra is given in Table 9.2.5.2-7; [otherwise, T SSB\_measurement\_period\_intra is given in Table 9.2.5.2-2.]

CSSFintra: it is a carrier specific scaling factor and is determined

according to CSSFoutside\_gap,i in clause 9.1.5.1 for measurement conducted outside measurement gaps, i.e. when intra-frequency SMTC is fully non overlapping or partially overlapping with measurement gaps or NCSG, or according to CSSFwithin\_gap,i in clause 9.1.5.2 for measurement conducted within measurement gaps, i.e. when intra-frequency SMTC is fully overlapping with measurement gaps, or according to CSSFwithin\_ncsg,i in clause 9.1.5.3 for measurement conducted within NCSG, i.e. when intra-frequency SMTC is fully overlapping with NCSG.

For a UE that supports Pre-MG, an SMTC occasion is only considered to be overlapped by Pre-MG if the Pre-MG is activated.

if the high layer in TS 38.331 [2] signalling of *smtc2* is configured, the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc2*; Otherwise the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

Mpss/sss\_sync\_w/o\_gaps : For a UE supporting FR2-1 power class 1 or 5, Mpss/sss\_sync\_w/o\_gaps =40. For a UE supporting power class 2, Mpss/sss\_sync\_w/o\_gaps =24. For a UE supporting FR2-1 power class 3, Mpss/sss\_sync\_w/o\_gaps =24. For a UE supporting FR2-1 power class 4, Mpss/sss\_sync\_w/o\_gaps =24. For a UE supporting FR2-2 power class 1, Mpss/sss\_sync\_w/o\_gaps =[TBD, TBD and TBD for 120kHz, 480kHz and 960kHz respectively]. For a UE supporting FR2-2 power class 2, Mpss/sss\_sync\_w/o\_gaps =[TBD, TBD and TBD for 120kHz, 480kHz and 960kHz respectively]. For a UE supporting FR2-2 power class 3, Mpss/sss\_sync\_w/o\_gaps =[TBD, TBD and TBD for 120kHz, 480kHz and 960kHz respectively].

Mmeas\_period\_w/o\_gaps : For a UE supporting FR2-1 power class 1 or 5, Mmeas\_period\_w/o\_gaps =40. For a UE supporting FR2-1 power class 2, Mmeas\_period\_w/o\_gaps =24. For a UE supporting FR2-1 power class 3, Mmeas\_period\_w/o\_gaps =24. For a UE supporting power class 4, Mmeas\_period\_w/o\_gaps =24. For a UE supporting FR2-2 power class 1, Mmeas\_period\_w/o\_gaps =TBD. For a UE supporting FR2-2 power class 2, Mmeas\_period\_w/o\_gaps =TBD. For a UE supporting FR2-2 power class 3, Mmeas\_period\_w/o\_gaps =TBD.

MSSB\_index\_intra: For a UE supporting FR2-2 power class 1, MSSB\_index\_intra = 72 samples. For a UE supporting FR2-2 power class 2, MSSB\_index\_intra = 48 samples. For a UE supporting FR2 power class 3, MSSB\_index\_intra = 48 samples.

When UE supports *concurrentMeasGap-r17* and is configured with concurrent measurement gaps,

Kp is the scaling factor for an SSB frequency layer to be measured without measurement gaps. Kp = Ntotal / Navailable, where Navailable and Ntotal are calculated as follows:

- For a window W of duration max(SMTC period, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE measurement gap and/or per-FR measurement gap within the same FR as the SSB frequency layer, and starting from the beginning of any SMTC occasion:

- Ntotal is the total number of SMTC occasions within the window, including those overlapped with measurement gap occasions within the window, and

- Navailable is the number of SMTC occasions that are not overlapped with any non-dropped MG occasion within the window W, after accounting for measurement gap collisions by applying the measurement gap collision rule in section 9.1.2B.3.

Kp = 1 when Navailable = 0.

- Otherwise, when UE is not configured with or UE does not support concurrent measurement gaps:

When intra-frequency SMTC is fully non overlapping with measurement gaps or intra-frequency SMTC is fully overlapping with MGs, Kp=1

When intra-frequency SMTC is partially overlapping with measurement gaps, Kp = 1/(1- (SMTC period /MGRP)), where SMTC period < MGRP. When intra-frequency SMTC is partially overlapping with the ML of NCSG, Kp = 1/(1- (SMTC period /VIRP)), where SMTC period < VIRP. For calculation of Kp, if the high layer signalling (TS 38.331 [2]) of *smtc2* is configured, for cells indicated in the *pci-List* parameter in *smtc2*, the SMTC periodicity corresponds to the value of higher layer parameter *smtc2*; for the other cells, the SMTC periodicity corresponds to the value of higher layer parameter *smtc1.*

If the higher layer signaling in TS38.331 [2] signalling of *smtc2* is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for Tidentify\_intra\_without\_index or Tidentify\_intra\_with\_index

For FR2,

Klayer1\_measurement=1,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or

- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols, given that *SSB-ToMeasure* and *SS-RSSI-Measurement* are configured, where SSB symbols are indicated by the union set of SSB-ToMeasure from all the configured measurement objects on the same serving carrier which can be merged.and RSSI symbols are indicated by *SS-RSSI-Measurement*;

Klayer1\_measurement=1.5, otherwise.

If the above-mentioned reference signal configured for L1-RSRP measurement is aperiodic CSI-RS resource, longer cell identification delay would be expected.

If MCG DRX is in use, cell identification requirements for intra-frequency measurement in MCG specified in Table 9.2.5.1-1, Table 9.2.5.1-2, Table 9.2.5.1-3, Table 9.2.5.1-4, Table 9.2.5.1-5 and Table 9.2.5.1-6 shall depend on the MCG DRX cycle. If SCG DRX is in use, cell identification requirements for intra-frequency measurement in SCG specified in Table 9.2.5.1-1, Table 9.2.5.1-2, Table 9.2.5.1-3, Table 9.2.5.1-4, Table 9.2.5.1-5, Table 9.2.5.1-6, Table 9.2.5.1-12, Table 9.2.5.1-13 and Table 9.2.5.1-14 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.5.1-1: Time period for PSS/SSS detection, (Frequency range FR1)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | max( 600ms, ceil( 5 x Kp) x SMTC period )Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max( 600ms, ceil(M2 Note 2x 5 x Kp) x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil(5 x Kp) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: When *highSpeedMeasFlag-r16* is not configured, M2 = 1.5; When *highSpeedMeasFlag-r16* is configured, M2 = 1.5 if SMTC periodicity > 40 ms;,otherwise M2=1.  NOTE 3: When *highSpeedMeasFlag-r16* is configured, the requirements apply only to UE supporting either *measurementEnhancement-r16* or *intraNR-MeasurementEnhancement-r16* on measurements of the primary component carrier and do not apply to measurements of a secondary component carrier with active SCell.  NOTE 4: When *highSpeedMeasCA-Scell-r17* is configured and UE supports *measurementEnhancementCA-r17*, M2 = 1.5 if SMTC periodicity > 40 ms; otherwise M2=1. | |

Table 9.2.5.1-2: Time period for PSS/SSS detection, (Frequency range FR2)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | max(600ms, ceil(Mpss/sss\_sync\_w/o\_gaps x KFR x Kp x Klayer1\_measurement)x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(600ms, ceil(1.5 x Mpss/sss\_sync\_w/o\_gaps x KFR x Kp x Klayer1\_measurement)x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil(Mpss/sss\_sync\_w/o\_gaps x KFR x Kp x Klayer1\_measurement) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: KFR is a scaling factor depending on the frequency range and the SSB SCS. For FR2-1, KFR = 1. For FR2-2: KFR = 1 if the SCS of the SSB of the cell being detected is 120 kHz, KFR = 2 if the SCS of the SSB of the cell being detected is 480 kHz, and KFR = 3 if the SCS of the SSB of the cell being detected is 960 kHz. | |

Table 9.2.5.1-3: Time period for time index detection (FR1)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra |
| No DRX | max(120ms, ceil( 3 x Kp )x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(120ms, ceil (M2 Note 2 x 3 x Kp) x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Ceil(3 x Kp) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: When *highSpeedMeasFlag-r16* is not configured, M2 = 1.5; When *highSpeedMeasFlag-r16* is configured, M2 = 1.5 if SMTC periodicity > 40 ms;,otherwise M2=1  NOTE 3: When *highSpeedMeasFlag-r16* is configured, the requirements apply only to UE supporting either *measurementEnhancement-r16* or *intraNR-MeasurementEnhancement-r16* on measurements of the primary component carrier and do not apply to measurements of a secondary component carrier with active SCell.  NOTE 4: When *highSpeedMeasCA-Scell-r17* is configured and UE supports *measurementEnhancementCA-r17*, M2 = 1.5 if SMTC periodicity > 40 ms; otherwise M2=1 | |

Table 9.2.5.1-4: Time period for PSS/SSS detection, deactivated SCell (FR1)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | Ceil(5 x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | Ceil(5 x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(5 x Kp) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: The requirements also apply to deactivated SCG SCell. | |

Table 9.2.5.1-5: Time period for PSS/SSS detection, deactivated SCell (FR2)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | Ceil(Mpss/sss\_sync\_w/o\_gaps x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | Ceil(Mpss/sss\_sync\_w/o\_gaps x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(Mpss/sss\_sync\_w/o\_gaps x Kp) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: The requirements also apply to deactivated SCG SCell. | |

Table 9.2.5.1-6: Time period for time index detection, deactivated SCell (FR1)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra |
| No DRX | Ceil(3 x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | Ceil(3 x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(3 x Kp) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: The requirements also apply to deactivated SCG SCell. | |

Table 9.2.5.1-7: Void

Table 9.2.5.1-8: Void

Table 9.2.5.1-9: Time period for PSS/SSS detection, deactivated SCell (FR1), when *highSpeedMeasCA-Scell-r17* is configured

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | Ceil(5 x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | Ceil(5 x Kp) x max(measCycleSCell, M2 Note 1xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(5 x Kp) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: M2 = 1.5 if SMTC periodicity > 40 ms; otherwise M2=1 | |

Table 9.2.5.1-10: Time period for time index detection, deactivated SCell (FR1)，when *highSpeedMeasCA-Scell-r17* is configured

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra |
| No DRX | Ceil(3 x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | Ceil(3 x Kp) x max(measCycleSCell, M2 Note 1xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(3 x Kp)x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: M2 = 1.5 if SMTC periodicity > 40 ms; otherwise M2=1 | |

Table 9.2.5.1-11: Time period for PSS/SSS detection when [*highSpeedMeasFlagFR2-r17*] is configured, (Frequency range FR2) when SMTC period <= 40ms

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | max(600ms, ceil(M1Note 2 x Kp x Klayer1\_measurement)x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 80ms | max(600ms, ceil(M1Note 2 x Kp x Klayer1\_measurement)x max(SMTC period,DRX cycle)) x CSSFintra |
| 80ms< DRX cycle≤ 320ms | ceil(1.5x Mpss/sss\_sync\_w/o\_gaps Note 3 x Kp x Klayer1\_measurement)x max(SMTC period,DRX cycle) x CSSFintra |
| DRX cycle>320ms | ceil(Mpss/sss\_sync\_w/o\_gaps Note 3 x Kp x Klayer1\_measurement) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: For UE supporting power class 6, M1= 6 if [*highSpeedMeasFlagFR2-r17* = set1] or M1= 18 if [*highSpeedMeasFlagFR2-r17* = set2]  NOTE 3: Mpss/sss\_sync\_w/o\_gaps =24. | |

Table 9.2.5.1-12: Time period for PSS/SSS detection, deactivated PSCell (FR1)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | Ceil(5 x Kp) x [measCyclePSCell] x CSSFintra |
| DRX cycle≤ 320ms | Ceil(5 x Kp) x max([measCyclePSCell], 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(5 x Kp) x max([measCyclePSCell], DRX cycle) x CSSFintra |

Table 9.2.5.1-13: Time period for PSS/SSS detection, deactivated PSCell (FR2)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | Ceil(Mpss/sss\_sync\_w/o\_gaps x Kp) x [measCyclePSCell] x CSSFintra |
| DRX cycle≤ 320ms | Ceil(Mpss/sss\_sync\_w/o\_gaps x Kp) x max([measCyclePSCell], 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(Mpss/sss\_sync\_w/o\_gaps x Kp) x max([measCyclePSCell], DRX cycle) x CSSFintra |

Table 9.2.5.1-14: Time period for time index detection, deactivated PSCell (FR1)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra |
| No DRX | Ceil(3 x Kp) x [measCyclePSCell] x CSSFintra |
| DRX cycle≤ 320ms | Ceil(3 x Kp) x max([measCyclePSCell], 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(3 x Kp) x max([measCyclePSCell], DRX cycle) x CSSFintra |

Table 9.2.5.1-15: Time period for time index detection (Frequency range FR2-2)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra |
| No DRX | max(200ms, ceil(MSSB\_index\_intra x Kp x SMTC period) x CSSFintra |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5 x MSSB\_index\_intra x Kp) x max(SMTC period, DRX cycle) x CSSFintra) |
| DRX cycle>320ms | Ceil(MSSB\_index\_intra x Kp )x DRX cycle x CSSFintra |

### < End of change 13, R4-2214971>

### < Start of change 14, R4-2214971>

### 9.2.6 Intra-frequency measurements with measurement gaps

#### 9.2.6.1 Void

#### 9.2.6.2 Intra-frequency cell identification

When a measurement gap is provided or an activated Pre-MG is provided without any pre-MG status changed during the measurement period, the UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured), or the UE has been indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_with\_index. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within Tidentify\_intra\_without\_index. It is assumed that *deriveSSB-IndexFromCell* is always enabled for FR1 TDD and FR2 with SCS smaller or equal to 480 kHz.

Tidentify\_intra\_without\_index = TPSS/SSS\_sync\_intra + T SSB\_measurement\_period\_intra ms

Tidentify\_intra\_with\_index = TPSS/SSS\_sync\_ntra + T SSB\_measurement\_period\_intra + TSSB\_time\_index\_intra ms

Where:

TPSS/SSS\_sync\_intra: it is the time period used in PSS/SSS detection given in table 9.2.6.2-1, 9.2.6.2-2 or 9.2.6.2-9.

TSSB\_time\_index\_intra: it is the time period used to acquire the index of the SSB being measured given in table 9.2.6.2-3 or 9.2.6.2-10 (for FR2-2).

T SSB\_measurement\_period\_intra: equal to a measurement period of SSB based measurement given in table 9.2.6.3-1 or 9.2.6.3-2.

CSSFintra: it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in clause 9.1.5.2 for measurement conducted within measurement gaps.

Kgap is the scaling factor for a SSB frequency layer to be measured within an associated measurement gap pattern. Kgap = 1 when the UE is not configured with concurrent measurement gaps or not supporting [concurrent measurement gaps]. Otherwise, Kgap = Ntotal / Navailable, where Navailable and Ntotal are calculated as follows:

For a window W of duration max(SMTC period, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE measurement gap and per-FR measurement gap within the same FR as the SSB frequency layer, and starting from the beginning of any SMTC occasion:

-- Ntotal is the total number of SMTC occasions that are covered by instances of the associated measurement gap within the window W, including those overlapped with other measurement gap occasions within the window, and

Navailable is the number of SMTC occasions that are covered by instances of the non-dropped associated measurement gap within the window W after accounting for measurement gap collisions by applying the measurement gap collision rule in section 9.1.2B.3.

When concurrent measurement gaps are configured, requirements in this clause do not apply if Navailable =0.

Mpss/sss\_sync\_with\_gaps : For a UE supporting FR2-1 power class 1 or 5, Mpss/sss\_sync with\_gaps=40. For a UE supporting FR2-1 power class 2, Mpss/sss\_sync with\_gaps =24. For a UE supporting FR2-1 power class 3, Mpss/sss\_sync with\_gaps =24. For a UE supporting FR2-1 power class 4, Mpss/sss\_sync with\_gaps =24. For a UE supporting FR2-2 power class 1, Mpss/sss\_sync with\_gaps = [TBD samples, TBD samples and TBD samples for 120kHz, 480kHz and 960kHz respectively]. For a UE supporting FR2-2 power class 2, Mpss/sss\_sync with\_gaps = [TBD samples, 72 samples and 108 samples for 120kHz, 480kHz and 960kHz respectively]. For a UE supporting FR2-2 power class 3, Mpss/sss\_sync with\_gaps = [TBD samples, TBD samples and TBD samples respectively].

Mmeas\_period\_ with\_gaps: For a UE supporting FR2-1 power class 1 or 5, Mmeas\_period\_ with\_gaps =40. For a UE supporting FR2-1 power class 2, Mmeas\_period\_ with\_gaps =24. For a UE supporting FR2-1 power class 3, Mmeas\_period\_ with\_gaps =24. For a UE supporting FR2-1 power class 4, Mmeas\_period with\_gaps =24. For a UE supporting FR2-2 power class 1, Mmeas\_period\_ with\_gaps =TBD samples. For a UE supporting FR2-2 power class 2, Mmeas\_period\_ with\_gaps =TBD samples. For a UE supporting FR2-2 power class 3, Mmeas\_period\_ with\_gaps = TBD samples.

MSSB\_index\_intra: For a UE supporting FR2-2 power class 1, MSSB\_index\_intra = 72 samples. For a UE supporting FR2-2 power class 2, MSSB\_index\_intra = 48 samples. For a UE supporting FR2 power class 3, MSSB\_index\_intra = 48 samples.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for Tidentify\_intra\_without\_index or Tidentify\_intra\_with\_index.

If MCG DRX is in use, cell identification requirements for intra-frequency measurement in MCG specified in Table 9.2.6.2-1, Table 9.2.6.2-2, and Table 9.2.6.2-3 shall depend on the MCG DRX cycle. If SCG DRX is in use, cell identification requirements for intra-frequency measurement in SCG specified in Table 9.2.6.2-1, Table 9.2.6.2-2, and Table 9.2.6.2-3 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.6.2-1: Time period for PSS/SSS detection (FR1)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | max(600ms, 5 x Kgap x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(600ms, ceil(M2Note 1x 5 x Kgap) x max(MGRP, SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Ceil( 5 x Kgap ) x max(MGRP, DRX cycle) x CSSFintra |
| NOTE 1: When *highSpeedMeasFlag-r16* is not configured, M2 = 1.5; When *highSpeedMeasFlag-r16* is configured, M2 = 1.5 if SMTC periodicity > 40 ms, otherwise M2=1.  NOTE 2: When *highSpeedMeasFlag-r16* is configured, the requirements apply only to UE supporting either *measurementEnhancement-r16* or *intraNR-MeasurementEnhancement-r16* on measurements of the primary component carrier and do not apply to measurements of a secondary component carrier with active SCell.  NOTE 3: For a UE supporting concurrent measurement gaps, if multiple concurrent gaps are configured, the MGRP is the periodicity of the MG pattern associated to the intra-frequency layer.  NOTE 4: When highSpeedMeasCA-Scell-r17 is configured, the requirements apply to UE on measurements of secondary component carrier with active SCell. | |

**Table 9.2.6.2-2: Time period for PSS/SSS detection (FR2)**

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | max(600ms, Mpss/sss\_sync\_with\_gaps x KFR x Kgap x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(600ms, ceil(1.5x Mpss/sss\_sync\_with\_gaps x KFR x Kgap) x max(MGRP, SMTC period, DRX cycle))x CSSFintra |
| DRX cycle>320ms | Ceil( Mpss/sss\_sync\_with\_gaps x KFR x Kgap ) x max(MGRP, DRX cycle) x CSSFintra |
| NOTE 1: For a UE supporting concurrent gaps, if multiple concurrent gaps are configured, the MGRP is the periodicity of the MG pattern associated to the intra-frequency layer.  NOTE 2: KFR is a scaling factor depending on the frequency range and the SSB SCS. For FR2-1, KFR = 1. For FR2-2: KFR = 1 if the SCS of the SSB of the cell being detected is 120 kHz, KFR = 2 if the SCS of the SSB of the cell being detected is 480 kHz, and KFR = 3 if the SCS of the SSB of the cell being detected is 960 kHz. | |

Table 9.2.6.2-3: Time period for time index detection (Frequency range FR1)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra |
| No DRX | max(120ms, ceil(3 x Kgap ) x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(120ms, ceil(M2Note 1x 3 x Kgap) x max(MGRP, SMTC period,DRX cycle) x CSSFintra) |
| DRX cycle>320ms | Ceil(3 x Kgap )x max(MGRP, DRX cycle) x CSSFintra |
| NOTE 1: When *highSpeedMeasFlag-r16* is not configured, M2 = 1.5; When *highSpeedMeasFlag-r16* is configured, M2 = 1.5 if SMTC periodicity > 40 ms, otherwise M2=1.  NOTE 2: When *highSpeedMeasFlag-r16* is configured, the requirements apply only to UE supporting either *measurementEnhancement-r16* or *intraNR-MeasurementEnhancement-r16* on measurements of the primary component carrier and do not apply to measurements of a secondary component carrier with active SCell.  NOTE 3: For a UE supporting concurrent gaps, if multiple concurrent gaps are configured, the MGRP is the periodicity of the MG pattern associated to the intra-frequency layer.  NOTE 4: When highSpeedMeasCA-Scell-r17 is configured, the requirements apply to UE on measurements of secondary component carrier with active SCell. | |

Table 9.2.6.2-7: Void

Table 9.2.6.2-8: Void

Table 9.2.6.2-9: Time period for PSS/SSS detection when [*highSpeedMeasFlagFR2-r17*] is configured, (FR2)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | max(600ms, M1Note 2 x Kgap x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 80ms | max(600ms, ceil(M1Note2 x M2Note 3x x Kgap) x max(MGRP, SMTC period, DRX cycle))x CSSFintra |
| 80ms< DRX cycle≤ 320ms | max(600ms, ceil(M2Note 3x Mpss/sss\_sync\_with\_gaps x Kgap) x max(MGRP, SMTC period, DRX cycle))x CSSFintra |
| DRX cycle>320ms | Ceil( Mpss/sss\_sync\_with\_gaps x Kgap ) x max(MGRP, DRX cycle) x CSSFintra |
| NOTE 1: For a UE supporting concurrent gaps, if multiple concurrent gaps are configured, the MGRP is the periodicity of the MG pattern associated to the intra-frequency layer.  NOTE 2: For UE supporting power class 6, M1= 6 if [*highSpeedMeasFlagFR2-r17* = set1] or M1= 18 if [*highSpeedMeasFlagFR2-r17* = set2]  NOTE 3: M2 = 1.5 if SMTC periodicity > 40 ms; otherwise M2 = 1 | |

Table 9.2.6.2-10: Time period for time index detection (Frequency range FR2-2)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_intra |
| No DRX | max(200ms, ceil(MSSB\_index\_intra x Kgap x max(MGRP, SMTC period)) x CSSFintra |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5 x MSSB\_index\_intra x Kgap) x max(MGRP, SMTC period, DRX cycle) x CSSFintra) |
| DRX cycle>320ms | Ceil(MSSB\_index\_intra x Kgap)x DRX cycle x CSSFintra |

### < End of change 14, R4-2214971>

### < Start of change 15, R4-2214983>

9.2A.7.2 Intra-frequency Channel occupancy measurements

The UE shall be capable of estimating the channel occupancy on one or more serving carrier frequencies indicated by higher layers [2], based on RSSI samples provided by the physical layer.

The UE can perform channel occupancy measurements without measurement gaps if RSSI measurement bandwidth is fully within the active DL BWP of the UE.

The measurement period for intra-frequency channel occupancy measurements without measurement gap is as shown in Table 9.2A.7.2-1 and Table 9.2A.7.1-2 for FR1, and in Table 9.2A.7.2-4 and Table 9.2A.7.1-5 for FR2-2. The measurement period for intra-frequency RSSI measurements with measurement gaps is as shown in Table 9.2A.7.2-3 for FR1, and in Table 9.2A.7.2-6 for FR2-2 .

**Table 9.2A.7.2-1: Measurement period for intra-frequency Channel Occupancy measurements without measurement gaps when SMTC and RMTC are overlapping (FR1)**

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **T RSSI\_measurement\_period\_intra\_cca** |
| No DRX | max(*reportInterval*, *rmtc-Periodicity*\*CSSFoutside\_gap,i) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, DRX cycle) \*CSSFoutside\_gap,i) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: CSSFoutside\_gap, iis a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in clause 9.1.5.1 for measurement conducted outside measurement gap. | |

**Table 9.2A.7.2-2: Measurement period for intra-frequency Channel Occupancy measurements without measurement gaps when SMTC and RMTC are not overlapping (FR1)**

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **T RSSI\_measurement\_period\_intra\_cca** |
| No DRX | max(*reportInt*erval, Nintra-MO\**rmtc-Periodicity*) |
| DRX | max(*reportInt*erval, Nintra-MO\*max(*rmtc-Periodicity*, DRXcycle length)) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: Nintra-MO is defined as the number of measurement objects that can be measured without gaps | |

**Table 9.2A.7.2-3: Measurement period for intra-frequency Channel Occupancy measurements with measurement gaps (FR1)**

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **T RSSI\_measurement\_period\_intra\_cca** |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFintra) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle length) x CSSFintra) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: CSSFintra is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in clause 9.1.5.2 for measurement conducted within measurement gaps. | |

**Table 9.2A.7.2-4: Measurement period for intra-frequency Channel Occupancy measurements without measurement gaps when SMTC and RMTC are overlapping (FR2-2)**

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **T RSSI\_measurement\_period\_intra\_cca** |
| No DRX | max(*reportInterval*, *rmtc-Periodicity*\*CSSFoutside\_gap,i) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, DRX cycle) \*CSSFoutside\_gap,i) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: CSSFoutside\_gap, i is a carrier specific scaling factor and is determined according to CSSF outside\_gap,i in clause 9.1.5.1 for measurement conducted outside measurement gap. | |

**Table 9.2A.7.2-5: Measurement period for intra-frequency Channel Occupancy measurements without measurement gaps when SMTC and RMTC are not overlapping (FR2-2)**

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **T RSSI\_measurement\_period\_intra\_cca** |
| No DRX | max(*reportInt*erval, Nintra-MO\**rmtc-Periodicity*) |
| DRX | max(*reportInt*erval, Nintra-MO\*max(*rmtc-Periodicity*, DRX cycle)) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: Nintra-MO is defined as the number of measurement objects that can be measured without gaps | |

**Table 9.2A.7.2-6: Measurement period for intra-frequency Channel Occupancy measurements with measurement gaps (FR2-2)**

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **T RSSI\_measurement\_period\_intra\_cca** |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFintra) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x CSSFintra) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: CSSFintra is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in clause 9.1.5.2 for measurement conducted within measurement gaps. | |

If the UE requires measurement gaps to perform intra-frequency measurements, a single measurement gap pattern is used for all concurrent intra-frequency measurements, including intra-frequency RSSI measurements. The RSSI measurement duration and the measurement gap should be aligned, and the following additional condition should be fulfilled:

- Entire RSSI measurement duration should be contained in the measurement gap.

The channel occupancy measurement performed and reported according to this clause shall meet the channel occupancy measurement accuracy requirements in Clause 10.1.35.1. The reported channel occupancy measurement values contained in measurement reports shall be based on the measurement reporting range specified in TS 38.331 [2].

9.2A.7.3 Scheduling restriction during RSSI and Channel Occupancy measurements in FR1

When the UE performs intra-frequency RSSI/CO measurements in unlicensed spectrum, the following restrictions apply due to RSSI/CO measurements:

- The UE is not expected to transmit PUCCH/PUSCH/SRS on UL symbols which are overlapping in time with the RSSI measurement symbols configured by RMTC.

When intra-band carrier aggregation in unlicensed spectrum is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with the aforementioned restricted symbols.

#### 9.2A.7.4 Scheduling restriction during RSSI measurements in FR2-2

When the UE performs intra-frequency RSSI measurements in unlicensed spectrum, the following restrictions apply due to RSSI measurements:

- The UE is not expected to transmit PUCCH/PUSCH/SRS on UL symbols which are overlapping in time with the RSSI measurement symbols configured by RMTC.

- The UE is not expected to receive PDCCH/PDSCH/TRS/CSI-RS for CQI on symbols which are overlapping in time with RSSI measurement symbols configured by RMTC if the RSSI measurement resources are not QCL-ed with typeD to the DL RS in the active TCI state of PDCCH/PDSCH.

- For 480 kHz and 960 kHz, The UE is not expected to receive PDCCH/PDSCH/TRS/CSI-RS for CQI on symbols which are overlapping in time with the first and last RSSI measurement symbols configured by RMTC.

When intra-band carrier aggregation in unlicensed spectrum is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with the aforementioned restricted symbols.

### < End of change 15, R4-2214983>

### < Start of change 16, R4-2214971>

### 9.3.4 Inter-frequency measurement with measurement gaps

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter frequency cell within Tidentify\_inter\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within Tidentify\_inter\_with\_index. The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within Tidentify\_inter\_without\_index.

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

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

Where:

TPSS/SSS\_sync\_inter: it is the time period used in PSS/SSS detection given in table 9.3.4-1, table 9.3.4-2, and table 9.3.4-5 when *highSpeedMeasInterFreq-r17* is configured and UE supports measurementEnhancementInterFreq-r17.

TSSB\_time\_index\_inter: it is the time period used to acquire the index of the SSB being measured given in table 9.3.4-3, and table 9.3.4-6 when *highSpeedMeasInterFreq* is configured and UE supports measurementEnhancementInterFreq-r17.

TSSB\_measurement\_period\_inter: equal to a measurement period of SSB based measurement given in table 9.3.5-1, table 9.3.5-2 and table 9.3.5-3 when *highSpeedMeasInterFreq* is configured and UE supports [measurementEnhancementInterFreq-r17.

Mpss/sss\_sync\_inter: For a UE supporting FR2-1 power class 1 or 5, Mpss/sss\_sync\_inter = 64 samples. For a UE supporting FR2-1 power class 2, Mpss/sss\_sync\_inter = 40 samples. For a UE supporting FR2-1 power class 3, Mpss/sss\_sync\_inter = 40 samples. For a UE supporting FR2-1 power class 4, Mpss/sss\_sync\_inter = 40 samples. For a UE supporting FR2-2 power class 1, Mpss/sss\_sync\_inter = [TBD samples, TBD samples and TBD samples for 120kHz, 480kHz and 960kHz respectively]. For a UE supporting FR2-2 power class 2, Mpss/sss\_sync\_inter = [TBD samples, TBD samples and TBD samples for 120kHz, 480kHz and 960kHz respectively]. For a UE supporting FR2-2 power class 3, Mpss/sss\_sync\_inter = [TBD samples, TBD samples and TBD samples respectively].

MSSB\_index\_inter: For a UE supporting FR2-1 power class 1 or 5, MSSB\_index\_inter = 40 samples. For a UE supporting FR2 power class 2, MSSB\_index\_inter = 24 samples. For a UE supporting FR2-1 power class 3, MSSB\_index\_inter = 24 samples. For a UE supporting FR2-1 power class 4, MSSB\_index\_inter = 24 samples. For a UE supporting FR2-2 power class 2 or 3, MSSB\_index\_inter = 48 samples. For a UE supporting FR2 power class 1, MSSB\_index\_inter = 72 samples.

Mmeas\_period\_inter: For a UE supporting FR2-1 power class 1 or 5, Mmeas\_period\_inter =64 samples. For a UE supporting FR2-1 power class 2, Mmeas\_period\_inter=40 samples. For a UE supporting FR2-1 power class 3, Mmeas\_period\_inter =40 samples. For a UE supporting FR2-1 power class 4, Mmeas\_period\_inter = 40 samples. For a UE supporting FR2-2 power class 1, Mmeas\_period\_inter =TBD samples. For a UE supporting FR2-2 power class 2, Mmeas\_period\_inter=TBD samples. For a UE supporting FR2-2 power class 3, Mmeas\_period\_inter =TBD samples.

CSSFinter: it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in clause 9.1.5.2 for measurement conducted within measurement gaps.

Kgap is a scaling factor for a SSB frequency layer to be measured within an associated measurement gap pattern. Kgap = 1 when the UE is not configured with concurrent measurement gaps. Otherwise, Kgap = Ntotal / Navailable, where Navailable and Ntotal are calculated as follows:

- For a window W of duration max(SMTC period, MGRP\_max), where MGRP\_max is the maximum MGRP across all configured per-UE measurement gap(s) and per-FR measurement gap(s) within the same FR, and starting from the beginning of any SMTC occasion:

- Ntotal is the total number of SMTC occasions that are covered by instances of the associated measurement gap within the window W, including those overlapped with other measurement gap occasions within the window, and

- Navailable is the number of SMTC occasions that are covered by instances of the non-dropped associated measurement gap within the window W, after accounting for collisions between the measurement gaps by applying the measurement gap collision rule in section 9.1.2B.3.

Kgap is only applicable for UE supporting *concurrentMeasGap-r17*. When concurrent measurement gaps are configured, requirements in this clause do not apply if Navailable =0.

Table 9.3.4-1: Time period for PSS/SSS detection (Frequency range FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TPSS/SSS\_sync\_inter |
| No DRX | Max(600ms, Ceil(8 \* Kgap) × Max(MGRP, SMTC period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(600ms, Ceil(8\*1.5 \* Kgap) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | Ceil(8 \* Kgap) × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: For a UE supporting concurrent gaps, the MRGP above is the MRGP of the measurement gap associated with the target frequency layer to be measured if concurrent measurement gaps are configured. | |

Table 9.3.4-2: Time period for PSS/SSS detection, (Frequency range FR2)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TPSS/SSS\_sync\_inter |
| No DRX | Max(600ms, Ceil(Kgap × Mpss/sss\_sync\_inter x KFR) × Max(MGRP, SMTC period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(600ms, Ceil(1.5 \* Kgap × Mpss/sss\_sync\_inter x KFR) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | Ceil(Kgap × Mpss/sss\_sync\_inter x KFR) × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: For a UE supporting concurrent gaps, the MRGP above is the MRGP of the measurement gap associated with the target frequency layer to be measured if concurrent measurement gaps are configured.  NOTE 4: KFR is a scaling factor depending on the frequency range and the SSB SCS. For FR2-1, KFR = 1. For FR2-2: KFR = 1 if the SCS of the SSB of the cell being detected is 120 kHz, KFR = 2 if the SCS of the SSB of the cell being detected is 480 kHz, and KFR = 3 if the SCS of the SSB of the cell being detected is 960 kHz. | |

Table 9.3.4-3: Time period for time index detection (Frequency range FR1)

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **TSSB\_time\_index\_inter** |
| No DRX | Max(120ms, Ceil(3 \* Kgap)× Max(MGRP, SMTC period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(120ms, Ceil(3 × 1.5 \* Kgap) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | Ceil(3 \* Kgap)× DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: For a UE supporting concurrent gaps, the MRGP above is the MRGP of the measurement gap associated with the target frequency layer to be measured if concurrent measurement gaps are configured. | |

Table 9.3.4-4: Time period for time index detection (Frequency range FR2)

|  |  |
| --- | --- |
| **Condition NOTE1,2** | **TSSB\_time\_index\_inter** |
| No DRX | Max(200ms, Ceil(Kgap × MSSB\_index\_inter)× Max(MGRP, SMTC period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(200ms, Ceil(1.5 \* Kgap × MSSB\_index\_inter) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | Ceil(Kgap ×MSSB\_index\_inter) × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: For a UE supporting concurrent gaps, the MRGP above is the MRGP of the measurement gap associated with the target frequency layer to be measured if concurrent measurement gaps are configured. | |

Table 9.3.4-5: Time period for PSS/SSS detection when highSpeedMeasInterFreq-r17 is configured (Frequency range FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TPSS/SSS\_sync\_inter |
| No DRX | max(200ms, N1 × Max(MGRP, SMTC period)) × CSSFinter  N1 = 7 |
| DRX cycle ≤ 160ms | max(200ms, ceil(N2) x max(MGRP, SMTC period, DRX cycle)) x CSSFinter  N2 = 7 x M2 |
| 160ms < DRX cycle ≤ 320ms | ceil(N3) x DRX cycle x CSSFinter  N3 = 7 x M2 |
| DRX cycle>320ms | N4 x DRX cycle x CSSFinter |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: M2 = 1.5 if SMTC periodicity > 40 ms, otherwise M2=1  NOTE 3: N4=6 if SMTC periodicity > 40 ms, otherwise N4=5 | |

Table 9.3.4-6: Time period for time index detection when highSpeedMeasInterFreq-r17 is configured (Frequency range FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | TSSB\_time\_index\_inter |
| No DRX | Max(120ms, 3 × Max(MGRP, SMTC period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(120ms, Ceil(3 × M2 NOTE3) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | 3 × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: M2 = 1.5 if SMTC periodicity > 40 ms, otherwise M2=1. | |

### < End of change 16, R4-2214971>

### < Start of change 17, R4-2214971>

### 9.3.9 Inter frequency measurements without measurement gaps

#### 9.3.9.1 Inter frequency Cell identification

If UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the Network, UE shall be able to identify a new detectable inter frequency cell within Tidentify\_inter\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within Tidentify\_inter\_with\_index. The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within Tidentify\_inter\_without\_index. It is assumed that when UE performs inter-frequency measurements without measurement gaps in a TDD bands on FR1 and FR2, the following conditions are met:

- SFN and frame boundary across serving cell and inter-frequency neighbor cells is aligned, and

- the timing of SSBs across serving cell and inter-frequency neighbor cells are aligned

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

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

Where:

TPSS/SSS\_sync\_inter: it is the time period used in PSS/SSS detection given in table 9.3.9.1-1 and table 9.3.9.1-2.

TSSB\_time\_index\_inter: it is the time period used to acquire the index of the SSB being measured given in table 9.3.9.1-3.

T SSB\_measurement\_period\_inter: equal to a measurement period of SSB based measurement given in table 9.3.9.2-1, table 9.3.9.2-2 and table 9.3.9.2-3 when highSpeedMeasInterFreq-r17 is configured and UE supports measurementEnhancementInterFreq-r17.

CSSFinter: it is a carrier specific scaling factor and is determined according to CSSFoutside\_gap,i in clause 9.1.5.1 for measurement conducted outside measurement gaps or NCSG, i.e. when interfrequency SMTC is fully non overlapping or partially overlapping with measurement gaps or according to CSSFwithin\_gap,i in clause 9.1.5.2 for measurement conducted within measurement gaps, i.e. when interfrequency SMTC is fully overlapping with measurement gaps, or according to CSSFwithin\_ncsg,i in clause 9.1.5.x for measurement conducted within NCSG, i.e. when inter-frequency SMTC is fully overlapping with NCSG.

Mpss/sss\_sync\_inter: For a UE supporting FR2-1 power class 1 or 5, Mpss/sss\_sync\_inter = 40 samples. For a UE supporting FR2-1 power class 2, Mpss/sss\_sync\_inter = 24 samples. For a UE supporting FR2-1 power class 3, Mpss/sss\_sync\_inter = 24 samples. For a UE supporting FR2-1 power class 4, Mpss/sss\_sync = 24 samples. For a UE supporting FR2-2 power class 1, Mpss/sss\_sync\_inter = [TBD, TBD and TBD for 120kHz, 480kHz and 960kHz respectively]. For a UE supporting FR2-2 power class 2, Mpss/sss\_sync\_inter = [TBD, TBD and TBD for 120kHz, 480kHz and 960kHz respectively]. For a UE supporting FR2-2 power class 3, Mpss/sss\_sync\_inter = [TBD, TBD and TBD for 120kHz, 480kHz and 960kHz respectively].

MSSB\_index\_inter: For a UE supporting power class 1 or 5, MSSB\_index\_inter = 40 samples. For a vehicle mounted UE supporting power class 2, Mpss/sss\_sync\_inter = 24 samples. For a UE supporting power class 3, MSSB\_index\_inter = 24 samples. For a UE supporting power class 4, Mmeas\_period\_inter = 24 samples.

Mmeas\_period\_inter: For a UE supporting FR2-1 power class 1 or 5, Mmeas\_period\_inter =40 samples. For a vehicle mounted UE supporting FR2-1 power class 2, Mpss/sss\_sync\_inter=24 samples. For a UE supporting FR2-1 power class 3, Mmeas\_period\_inter =24 samples. For a UE supporting FR2-1 power class 4, Mmeas\_period\_inter = 24 samples. For a UE supporting FR2-2 power class 1, Mmeas\_period\_inter =TBD samples. For a vehicle mounted UE supporting FR2-2 power class 2, Mpss/sss\_sync\_inter=TBD samples. For a UE supporting FR2-2 power class 3, Mmeas\_period\_inter =TBD samples.

Kp is a scaling factor for an SSB frequency layer to be measured without measurement gaps. Kp = Ntotal / Navailable, where Navailable and Ntotal are calculated as follows:

For a window W of duration max(SMTC period, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE MG and per-FR MG within the same FR as the SSB frequency layer, and starting at the beginning of any SMTC occasion:

Ntotal is the total number of SMTC occasions within the window, including those overlapped with MG occasions within the window, and

Navailable is the number of SMTC occasions that are not overlapped with any MG occasion within the window W, after accounting for MG collisions by applying the selected gap collision rule provided that concurrent measurement gaps are configured.

Kp = 1 when Navailable = 0.

For calculation of Kp, if the high layer signalling (TS 38.331 [2]) of *smtc2* is configured, for cells indicated in the *pci-List* parameter in *smtc2*, the SMTC periodicity corresponds to the value of higher layer parameter *smtc2*; for the other cells, the SMTC periodicity corresponds to the value of higher layer parameter *smtc1.*~~]~~ Kp is only applicable for UE supporting *concurrentMeasGap-r17*.

When interfrequency SMTC is fully non overlapping with measurement gaps or interfrequency SMTC is fully overlapping with MGs, Kp=1.

When interfrequency SMTC is partially overlapping with measurement gaps, Kp = 1/(1- (SMTC period /MGRP)), where SMTC period < MGRP. When inter-frequency SMTC is partially overlapping with the VIL of NCSG, Kp = 1/(1- (SMTC period /VIRP)), where SMTC period < VIRP.

For FR2,

Klayer1\_measurement=1,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or

- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols, given that *SSB-ToMeasure* and *SS-RSSI-Measurement* are configured, where SSB symbols are indicated by *SSB-ToMeasure* and RSSI symbols are indicated by *SS-RSSI-Measurement*;

Klayer1\_measurement=1.5, otherwise.

If the above-mentioned reference signal configured for L1-RSRP measurement is aperiodic CSI-RS resource, longer cell identification delay would be expected.

Table 9.3.9.1-1: Time period for PSS/SSS detection, (FR1)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_inter |
| No DRX | max( 600ms, ceil( 5 x Kp) x SMTC period )Note 1 x CSSFinter |
| DRX cycle≤ 320ms | max( 600ms, ceil(1.5x 5 x Kp) x max(SMTC period,DRX cycle)) x CSSFinter |
| DRX cycle>320ms | ceil(5 x Kp) x DRX cycle x CSSFinter |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: Kp is applicable for UE supporting [concurrent gaps]  NOTE 3: When highSpeedMeasInterFreq-r17 is not configured, M2 = 1.5; When highSpeedMeasInterFreq-r17 is configured, M2 = 1.5 if SMTC periodicity > 40 ms; otherwise M2 = 1 | |

Table 9.3.9.1-2: Time period for PSS/SSS detection, (FR2)

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_inter |
| No DRX | max(600ms, ceil(Mpss/sss\_sync\_inter x Kp x Klayer1\_measurement)x SMTC period)Note 1 x CSSFinter |
| DRX cycle≤ 320ms | max(600ms, ceil(1.5 x Mpss/sss\_sync\_inter x Kp x Klayer1\_measurement)x max(SMTC period,DRX cycle)) x CSSFinter |
| DRX cycle>320ms | ceil(Mpss/sss\_sync\_inter x Kp x Klayer1\_measurement) x DRX cycle x CSSFinter |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: Kp is applicable for UE supporting [concurrent gaps] | |

Table 9.3.9.1-3: Time period for time index detection (FR1)

|  |  |
| --- | --- |
| DRX cycle | TSSB\_time\_index\_inter |
| No DRX | max(120ms, ceil( 3 x Kp )x SMTC period)Note 1 x CSSFinter |
| DRX cycle≤ 320ms | max(120ms, ceil (1.5 x 3 x Kp) x max(SMTC period,DRX cycle)) x CSSFinter |
| DRX cycle>320ms | Ceil(3 x Kp) x DRX cycle x CSSFinter |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: Kp is applicable for UE supporting [concurrent gaps]  NOTE 3: When highSpeedMeasInterFreq-r17 is not configured, M2 = 1.5; When highSpeedMeasInterFreq-r17 is configured, M2 = 1.5 if SMTC periodicity > 40 ms; otherwise M2 = 1 | |

#### 9.3.9.2 Measurement period

The UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in clauses 10.1.4, 10.1.5, 10.1.9, 10.1.10, 10.1.14 and 10.1.15, respectively, as shown in table 9.3.9.2-1 and 9.3.9.2-2, if UE supports inter-frequency measurement without measurement gaps. When highSpeedMeasInterFreq-r17 is configured and UE supports [measurementEnhancementInterFreq-r17], T SSB\_measurement\_period\_inter is specified in table 9.3.9.2-3.

Table 9.3.9.2-1: Measurement period for inter-frequency measurements without gaps ((FR1)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_inter |
| No DRX | max(200ms, ceil( 5 x Kp) x SMTC period)Note 1 x CSSFinter |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5x 5 x Kp) x max(SMTC period,DRX cycle)) x CSSFinter |
| DRX cycle>320ms | ceil( 5 x Kp ) x DRX cycle x CSSFinter |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified | |

Table 9.3.9.2-2: Measurement period for inter-frequency measurements without gaps (FR2)

|  |  |
| --- | --- |
| **DRX cycle** | **T SSB\_measurement\_period\_inter** |
| No DRX | max(400ms, ceil(Mmeas\_period\_inter x Kp x Klayer1\_measurement) x SMTC period)Note 1 x CSSFinter |
| DRX cycle≤ 320ms | max(400ms, ceil(1.5x Mmeas\_period\_inter x Kp x Klayer1\_measurement) x max(SMTC period,DRX cycle)) x CSSFinter |
| DRX cycle>320ms | ceil(Mmeas\_period\_inter xKp x Klayer1\_measurement) x DRX cycle x CSSFinter |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified | |

Table 9.3.9.2-3: Measurement period for inter-frequency measurements without gaps when highSpeedMeasInterFreq-r17 is configured (FR1)

|  |  |
| --- | --- |
| **DRX cycle** | **T SSB\_measurement\_period\_inter** |
| No DRX | max(200ms, ceil( 5 x Kp) x SMTC period)Note 1 x CSSFinter |
| DRX cycle≤ 160ms | max(200ms, ceil(5 x M2 Note 2 x Kp) x max(SMTC period, DRX cycle)) x CSSFinter |
| 160ms < DRX cycle≤ 320ms | ceil(4 x M2 Note 2 x Kp) x max(SMTC period,DRX cycle) x CSSFinter |
| DRX cycle>320ms | ceil( Y Note 3 x Kp ) x DRX cycle x CSSFinter |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: M2 = 1.5 if SMTC period > 40 ms, otherwise M2 = 1  NOTE 3: Y=3 when SMTC period <= 40ms, Y=5 when SMTC period > 40ms | |

### < End of change 17, R4-2214971>

### < Start of change 18, R4-2213027>

A.3.10.2 SSB Configurations for FR2

A.3.10.2.1 SSB pattern 1 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.1-1: SSB.1 FR2: SSB Pattern 1 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

|  |  |  |
| --- | --- | --- |
| SSB Parameters | Values | |
| Channel bandwidth | 100 MHz | |
| SSB SCS | 120 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSBs Note 2 | 4-7 | 8-11 |
| Slot numbers containing SSB Note 2 | 0 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10.2.2 SSB pattern 2 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.2-1: SSB.2 FR2: SSB Pattern 2 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| Channel bandwidth | 100 MHz | |
| SSB SCS | 240 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSBs Note 2 | 8-11 | 12-13, 0-1 |
| Slot numbers containing SSB Note 2 | 0 | 0, 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10.2.3 SSB pattern 3 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.3-1: SSB.3 FR2: SSB Pattern 3 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 100 MHz |
| SSB SCS | 120 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSBs Note 2 | 4-7 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

A.3.10.2.4 SSB pattern 4 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.4-1: SSB.4 FR2: SSB Pattern 4 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 100 MHz |
| SSB SCS | 240 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSBs Note 2 | 8-11 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

A.3.10.2.5 SSB pattern 5 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.5-1: SSB.5 FR2: SSB Pattern 5 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| Channel bandwidth | 100 MHz | |
| SSB SCS | 120 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 6-9 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10.2.6 SSB pattern 6 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.6-1: SSB.6 FR2: SSB Pattern 6 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

|  |  |  |
| --- | --- | --- |
| SSB Parameters | Values | |
| Channel bandwidth | 100 MHz | |
| SSB SCS | 240 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 6-9 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10.2.7 SSB pattern 7 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.7-1: SSB.7 FR2: SSB Pattern 7 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 100 MHz |
| SSB SCS | 120 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 1 |
| Symbol numbers containing SSBs Note 2 | 8-11 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

A.3.10.2.8 SSB pattern 8 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.8-1: SSB.8 FR2: SSB Pattern 8 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

|  |  |  |
| --- | --- | --- |
| SSB Parameters | Values | |
| Channel bandwidth | 100 MHz | |
| SSB SCS | 240 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 1 | |
| SS/PBCH block index | 1 | |
| Symbol numbers containing SSBs Note 2 | 12-13 | 0-1 |
| Slot numbers containing SSB Note 2 | 0 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10.2.9 SSB pattern 9 in FR2: SSB allocation for SSB SCS=480 kHz in 400 MHz

Table A.3.10.2.9-1: SSB.9 FR2: SSB Pattern 9 for SSB SCS = 480 kHz in 400 MHz channel with 2 SSBs per SS-burst

|  |  |  |
| --- | --- | --- |
| SSB Parameters | Values | |
| Channel bandwidth | 400 MHz | |
| SSB SCS | 480 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 9-12 |
| Slot numbers containing SSB Note 2 | 0 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10.2.10 SSB pattern 10 in FR2: SSB allocation for SSB SCS=960 kHz in 400 MHz

Table A.3.10.2.10-1: SSB.10 FR2: SSB Pattern 10 for SSB SCS = 960 kHz in 400 MHz channel with 2 SSBs per SS-burst

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| Channel bandwidth | 400 MHz | |
| SSB SCS | 960 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 0 | 1 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 9-12 |
| Slot numbers containing SSB Note 2 | 0 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10.2.11 SSB pattern 11 in FR2: SSB allocation for SSB SCS=480 kHz in 400 MHz

Table A.3.10.2.11-1: SSB.11 FR2: SSB Pattern 11 for SSB SCS = 480 kHz in 400 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 480 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSBs Note 2 | 2-5 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

A.3.10.2.12 SSB pattern 12 in FR2: SSB allocation for SSB SCS=960 kHz in 400 MHz

Table A.3.10.2.12-1: SSB.12 FR2: SSB Pattern 12 for SSB SCS = 960 kHz in 400 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 960 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 0 |
| Symbol numbers containing SSBs Note 2 | 2-5 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

A.3.10.2.13 SSB pattern 13 in FR2: SSB allocation for SSB SCS=480 kHz in 400 MHz

Table A.3.10.2.13-1: SSB.13 FR2: SSB Pattern 13 for SSB SCS = 480 kHz in 400 MHz channel with 2 SSBs per SS-burst

|  |  |  |
| --- | --- | --- |
| **SSB Parameters** | **Values** | |
| Channel bandwidth | 400 MHz | |
| SSB SCS | 480 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 9-12 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10.2.14 SSB pattern 14 in FR2: SSB allocation for SSB SCS=960 kHz in 400 MHz

Table A.3.10.2.14-1: SSB.14 FR2: SSB Pattern 14 for SSB SCS = 960 kHz in 400 MHz channel with 2 SSBs per SS-burst

|  |  |  |
| --- | --- | --- |
| SSB Parameters | Values | |
| Channel bandwidth | 400 MHz | |
| SSB SCS | 960 kHz | |
| SSB periodicity (TSSB) | 20 ms | |
| Number of SSBs per SS-burst | 2 | |
| SS/PBCH block index | 2 | 3 |
| Symbol numbers containing SSBs Note 2 | 2-5 | 9-12 |
| Slot numbers containing SSB Note 2 | 1 | 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 | |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | |

A.3.10.2.15 SSB pattern 15 in FR2: SSB allocation for SSB SCS=480 kHz in 400 MHz

Table A.3.10.2.15-1: SSB.15 FR2: SSB Pattern 15 for SSB SCS = 480 kHz in 400 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 480 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 1 |
| Symbol numbers containing SSBs Note 2 | 9-12 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

A.3.10.2.16 SSB pattern 16 in FR2: SSB allocation for SSB SCS=960 kHz in 400 MHz

Table A.3.10.2.16-1: SSB.16 FR2: SSB Pattern 16 for SSB SCS = 960 kHz in 400 MHz channel with 1 SSB per SS-burst

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 400 MHz |
| SSB SCS | 960 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSBs per SS-burst | 1 |
| SS/PBCH block index | 1 |
| Symbol numbers containing SSBs Note 2 | 9-12 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSBs within channel BW | (RBJ, RBJ+1,.…, RBJ+39)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

### < End of change 18, R4-2213027>

### < Start of change 19, R4-2214984>

#### A.7.3.1.X1 Intra-frequency handover from FR2-2 to FR2-2; unknown target cell

##### A.7.3.1.X1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-2-NR FR2-2 intra frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.X1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.X1.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.X1.2-2, and A.7.3.1.X1.2-3.

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.X1.2-1: Intra-frequency handover from FR2-2 to FR2-2 test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.X1.2-2: General test parameters Intra-frequency handover from FR2-2 to FR2-2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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.X1.2-3: Cell specific test parameters for NR FR2-2-FR2-2 Intra frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Config | Cell 1 | | | | Cell 2 | | |
|  | |  | T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | |  | 1,2,3 | Rough | | | | Rough | | |
| AoA setup | |  | 1,2,3 | Setup 1 as defined in A.3.15 | | | | | | |
| NR RF Channel Number | |  | 1,2,3 | **1** | | | | **1** | | |
| Duplex mode | |  | 1,2,3 | TDD | | | | | | |
| TDD configuration | |  | 1 | TBD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| BWchannel | | MHz | 1 | 100: NRB,c = 66 | | | | | | |
| 2 | 400: NRB,c = 66 | | | | | | |
| 3 | 400: NRB,c = 33 | | | | | | |
| Data RBs allocated | |  | 1 | 66 | | | | | | |
|  | 2 | 66 | | | | | | |
|  | 3 | 33 | | | | | | |
| DRx Cycle | | ms | 1,2,3 | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | |  | 1 | SR3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| RMSI CORESET Reference Channel | |  | 1 | CR3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| Control Channel RMC | |  | 1 | CCR.3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| OCNG Patterns | |  | 1,2,3 | O P. 1 | | | | | | |
| SMTC Configuration | |  | 1,2,3 | SMTC pattern 1 | | | | | | |
| SSB Configuration | |  | 1 | SSB. 3 FR2 | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 120 | | | | | | |
| 2 | 480 | | | | | | |
| 3 | 960 | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 1 | 120 | | | | | | |
| 2 | 480 | | | | | | |
| 3 | 960 | | | | | | |
| PRACH configuration | |  | 1,2,3 | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | |  | 1 | TRS.2.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| PDSCH/PDCCH TCI state | |  | 1,2,3 | TCI.State.2 | | | | | | |
| BWP configuraiton | Initial DL BWP |  | 1,2,3 | DLBWP.0.1 | | | | | | |
| Dedicated DL BWP |  | 1,2,3 | DLBWP.1.1 | | | | | | |
| Initial UL BWP |  | 1,2,3 | ULBWP.0.1 | | | | | | |
| Dedicated UL BWP |  | 1,2,3 | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to SSS | | dB |  | 0 | | | 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 | 1 | -95.7 | | | | | | |
| 2 | -89.7 | | | | | | |
| 3 | -86.7 | | | | | | |
|  | | dB |  | 6 | -1.8 | | -Infinity | | 0 | |
|  | | dB |  | 6 | 6 | | -Infinity | | 7 | |
| IoNote3 | | dBm/95.04 MHz Note4 |  | -59.7 | -56.7 | | -59.7 | | -56.7 | |
| dBm/380.16 MHz Note4 |  | -53.7 | -50.7 | | -53.7 | | -50.7 | |
| 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.X1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 772 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 = 762 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 772 ms.

### < End of change 19, R4-2214984>

### < Start of change 20, R4-2214984>

#### A.7.3.1.X2 Inter-frequency handover from FR2-2 to FR2-2; unknown target cell

##### A.7.3.1.X2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-2-NR FR2-2 Inter frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.X2.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.X2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.X2.2-2, and A.7.3.1.X2.2-3.

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.X2.2-1: Inter-frequency handover from FR2-2 to FR2-2 test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.X2.2-2: General test parameters Inter-frequency handover from FR2-2 to FR2-2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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.X2.2-3: Cell specific test parameters for NR FR2-2-FR2-2 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Config | Cell 1 | | | | Cell 2 | | |
|  | |  | T1 | | T2 | | T1 | | T2 |
| Assumption for UE beamsNote 6 | |  | 1,2,3 | Rough | | | | Rough | | |
| AoA setup | |  | 1,2,3 | Setup 1 as defined in A.3.15 | | | | | | |
| NR RF Channel Number | |  | 1,2,3 | **1** | | | | **2** | | |
| Duplex mode | |  | 1,2,3 | TDD | | | | | | |
| TDD configuration | |  | 1 | TBD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| BWchannel | | MHz | 1 | 100: NRB,c = 66 | | | | | | |
| 2 | 400: NRB,c = 66 | | | | | | |
| 3 | 400: NRB,c = 33 | | | | | | |
| Data RBs allocated | |  | 1 | 66 | | | | | | |
|  | 2 | 66 | | | | | | |
|  | 3 | 33 | | | | | | |
| DRx Cycle | | ms | 1,2,3 | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | |  | 1 | SR3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| RMSI CORESET Reference Channel | |  | 1 | CR3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| Control Channel RMC | |  | 1 | CCR.3.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| OCNG Patterns | |  | 1,2,3 | O P. 1 | | | | | | |
| SMTC Configuration | |  | 1,2,3 | SMTC pattern 1 | | | | | | |
| SSB Configuration | |  | 1 | SSB. 3 FR2 | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 120 | | | | | | |
| 2 | 480 | | | | | | |
| 3 | 960 | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 1 | 120 | | | | | | |
| 2 | 480 | | | | | | |
| 3 | 960 | | | | | | |
| PRACH configuration | |  | 1,2,3 | FR2 PRACH configuration 1 | | | | | | |
| TRS configuration | |  | 1 | TRS.2.1 TDD | | | | | | |
|  | 2 | TBD | | | | | | |
|  | 3 | TBD | | | | | | |
| PDSCH/PDCCH TCI state | |  | 1,2,3 | TCI.State.2 | | | | | | |
| BWP configuraiton | Initial DL BWP |  | 1,2,3 | DLBWP.0.1 | | | | | | |
| Dedicated DL BWP |  | 1,2,3 | DLBWP.1.1 | | | | | | |
| Initial UL BWP |  | 1,2,3 | ULBWP.0.1 | | | | | | |
| Dedicated UL BWP |  | 1,2,3 | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to SSS | | dB |  | 0 | | | 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 | 1 | -95.7 | | | | | | |
| 2 | -89.7 | | | | | | |
| 3 | -86.7 | | | | | | |
|  | | dB |  | 6 | 6 | | -Infinity | | 7 | |
|  | | dB |  | 6 | 6 | | -Infinity | | 7 | |
| IoNote3 | | dBm/95.04 MHz Note4 |  | -59.7 | -59.7 | | -58.9 | | -58.9 | |
| dBm/380.16 MHz Note4 |  | -53.7 | -53.7 | | -52.9 | | -52.9 | |
| 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.X2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 772 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 = 762 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 772 ms.

### < End of change 20, R4-2214984>

### < End of change 21, R4-2214984>

#### A.7.3.1.X3 Inter-frequency handover from FR1 to FR2-2; unknown target cell

##### A.7.3.1.X3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR2-2 Inter frequency handover requirements specified in clause 6.1.1.4.

##### A.7.3.1.X3.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.X3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.X3.2-2, and A.7.3.1.X3.2-3.

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.X3.2-1: Inter-frequency handover from FR1 to FR2-2 test configurations

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Description** | |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz | 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.7.3.1.X3.2-2: General test parameters Inter-frequency handover from FR1 to FR2-2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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.X3.2-3: Cell specific test parameters for NR FR1-FR2-2 Inter frequency handover test case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Config | Cell 1 | | Cell 2 | | |
|  | |  | T1 | T2 | T1 | | T2 |
| Assumption for UE beamsNote 6 | |  | 1,2,3 | - | | Rough | | |
| AoA setup | |  | 1,2,3 | - | | Setup 1 as defined in A.3.15 | | |
| NR RF Channel Number | |  | 1,2,3 | **1** | | **2** | | |
| Duplex mode | |  | 1 | FDD | | TDD | | |
|  | 2,3 | TDD | | TDD | | |
| TDD configuration | |  | 1 | - | | TBD | | |
|  | 2 | TDDConf.1.1 | | TBD | | |
|  | 3 | TDDConf.2.1 | | TBD | | |
| BWchannel | | MHz | 1 | 10: NRB,c = 52 | | 100: NRB,c = 66 | | |
| 2 | 10: NRB,c = 52 | | 400: NRB,c = 66 | | |
| 3 | 40: NRB,c = 106 | | 400: NRB,c = 33 | | |
| Data RBs allocated | |  | 1 | 52 | | 66 | | |
|  | 2 | 52 | | 66 | | |
|  | 3 | 106 | | 33 | | |
| DRx Cycle | | ms | 1,2,3 | Not Applicable | | Not Applicable | | |
| PDSCH Reference measurement channel | |  | 1 | SR.1.1 FDD | | SR3.1 TDD | | |
|  | 2 | SR.1.1 TDD | | TBD | | |
|  | 3 | SR2.1 TDD | | TBD | | |
| RMSI CORESET Reference Channel | |  | 1 | CR.1.1 FDD | | CR3.1 TDD | | |
|  | 2 | CR.1.1 TDD | | TBD | | |
|  | 3 | CR2.1 TDD | | TBD | | |
| Control Channel RMC | |  | 1 | CCR.1.1 FDD | | CCR.3.1 TDD | | |
|  | 2 | CCR.1.1 TDD | | TBD | | |
|  | 3 | CCR.2.1 TDD | | TBD | | |
| OCNG Patterns | |  | 1,2,3 | O P. 1 | | O P. 1 | | |
| SMTC Configuration | |  | 1 | SMTC.1 | | SMTC pattern 1 | | |
|  | |  | 2,3 | SMTC.2 | | SMTC pattern 1 | | |
| SSB Configuration | |  | 1 | SSB.1 FR1 | | SSB. 3 FR2 | | |
|  | 2 | SSB.2 FR1 | | TBD | | |
|  | 3 | SSB.2 FR1 | | TBD | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | 1 | 15 | | 120 | | |
| 2 | 30 | | 480 | | |
| 3 | 30 | | 960 | | |
| PUCCH/PUSCH subcarrier spacing | | kHz | 1 | 15 | | 120 | | |
| 2 | 30 | | 480 | | |
| 3 | 30 | | 960 | | |
| PRACH configuration | |  | 1,2,3 | FR1 PRACH configuration 1 | | FR2 PRACH configuration 1 | | |
| TRS configuration | |  | 1 | TRS.1.1 FDD | | TRS.2.1 TDD | | |
|  | 2 | TRS.1.1 TDD | | TBD | | |
|  | 3 | TRS.1.2 TDD | | TBD | | |
| PDSCH/PDCCH TCI state | |  | 1,2,3 | - | | TCI.State.2 | | |
| BWP configuraiton | Initial DL BWP |  | 1,2,3 | DLBWP.0.1 | | DLBWP.0.1 | | |
| Dedicated DL BWP |  | 1,2,3 | LBWP.1.1 | | DLBWP.1.1 | | |
| Initial UL BWP |  | 1,2,3 | ULBWP.0.1 | | ULBWP.0.1 | | |
| Dedicated UL BWP |  | 1,2,3 | 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 | | dBm/SCS | 1 | -95.7 | | |
| 2 | -89.7 | | |
| 3 | -86.7 | | |
|  | | dB |  | -Infinity | 7 | |
|  | | dB |  | -Infinity | 7 | |
| IoNote3 | | dBm/95.04 MHz Note4 |  | -58.9 | -58.9 | |
| dBm/380.16 MHz Note4 |  | -52.9 | -52.9 | |
| Propagation condition | | - |  | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  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.X3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 772 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 = 762 ms in the test. Tinterrupt is defined in clause 6.1.1.4.2.

This gives a total of 772 ms.

### < End of change 21, R4-2214984>

### < Start of change 22, R4-2214985>

A.7.4.1.x1 NR UE Transmit Timing Test for FR2-2

A.7.4.1.x1.1 Test Purpose and environment

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

Supported test configurations are shown in Table 7.4.1.x1.1-1.

**Table A.7.4.1.x1.1-1: Supported test configurations for FR2 PCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

For this test a single NR cell is used. Tables A.7.4.1.x1.1-2 and A.7.4.1.x1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.4.1.x1.1-3.

**Table A.7.4.1.x1.1-2: Cell Specific Test Parameters for UL Transmit Timing test**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test1** | | | **Test2** | |
| SSB ARFCN |  | 1 | Freq1 | | | Freq1 | |
| TDD configuration |  | 1 | | TBD | | | |
|  | 2 | | TBD | | | |
|  | 3 | | TBD | | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | | |
| 2 | 400: NRB,c = 66 | | | | |
| 3 | 400: NRB,c = 33 | | | | |
| Data RBs allocated |  | 1 | 66 | | | | |
|  | 2 | 66 | | | | |
|  | 3 | 33 | | | | |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 | | | | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| PDSCH/PDCCH TCI state |  | 1,2,3 | TCI.State.2 | | | | |
| DRx Cycle | ms | 1,2,3 | N/A | | | | DRX.8Note5 |
| PDSCH Reference measurement channel |  | 1 | SR.3. 3 TDD | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| RMSI CORESET Reference Channel |  | 1 | CR.3. 2 TDD | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| Dedicated CORESET Reference Channel |  | 1 | CCR.3. 7 TDD | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| OCNG Patterns |  | 1,2,3 | OP.1 | | | | |
| SSB Configuration |  | 1 | SSB.4 FR2 | | | | |
|  | 2 | TBD | | | | |
|  | 3 | TBD | | | | |
| SMTC Configuration |  | 1,2,3 | SMTC.1 | | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 120 | | | | |
| 2 | 480 | | | | |
| 3 | 960 | | | | |
| EPRE ratio of PSS to SSS | dB | 1 | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | | |  | |
| Propagation condition |  | 1 | AWGN | | | | |
| SRS Config |  | 1 | SRSConf.1Note6 | | SRSConf.2Note6 | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: Void  Note 5: DRx related parameters are given in Table A.3.3.8-1  Note 6: SRS configs are given in Table A.7.4.1.x1.1-3 | | | | | | | |

**Table A.7.4.1.x1.1-2A: OTA related test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Test 1** | **Test 2** |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 6 |  | 1,2,3 | Fine | |
| Note1 | dBm/15kHzNote4 |  | -112 | |
| Note1 | dBm/SCSNote3 | 1 | -100 | |
|  | 2 | -94 | |
|  | 3 | -91 | |
|  | dB | 1,2,3 | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | 1 | -96 | |
|  | 2 | -90 | |
|  | 3 | -87 | |
|  | dB | 1,2,3 | 4 | |
| IoNote2 | dBm/95.04 MHz Note4 | 1 | -68.5 | |
| dBm/380.16 MHz Note4 | 2,3 | -62.5 | |
| 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 B\_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: 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.7.4.1.x1.1-3: SRS Configuration for Timing Accuracy Test**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Field** | **SRSConf.1** | **SRSConf.2** | **Comments** |
| SRS-ResourceSet | srs-ResourceSetId | 0 | 0 |  |
|  | srs-ResourceIdList | 0 | 0 |  |
|  | resourceType | Periodic | Periodic |  |
|  | Usage | Codebook | Codebook |  |
| SRS-Resource | SRS-ResourceId | 0 | 0 |  |
|  | nrofSRS-Ports | Port1 | Port1 |  |
|  | transmissionComb | n2 | n2 |  |
|  | combOffset-n2 | 0 | 0 |  |
|  | cyclicShift-n2 | 0 | 0 |  |
|  | resourceMapping  startPosition | 0 | 0 |  |
|  | resourceMapping  nrofSymbols | n1 | n1 |  |
|  | resourceMapping  repetitionFactor | n1 | n1 |  |
|  | freqDomainPosition | 0 | 0 |  |
|  | freqDomainShift | 0 | 0 |  |
|  | freqHopping  c-SRS | 17 | 17 | Matches NRB,c |
|  | freqHopping  b-SRS | 0 | 0 |  |
|  | freqHopping  b-hop | 0 | 0 |  |
|  | groupOrSequenceHopping | Neither | Neither |  |
|  | resourceType | Periodic | Periodic |  |
|  | periodicityAndOffset-p | sl1, 0 | sl2560, 4 | Offset to align with DRx periodicity |
|  | sequenceId | 0 | 0 | Any 10 bit number |

A.7.4.1.x1.2 Test requirements

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

Following will be the test sequence for this test:

1) Setup NR PCell according to parameters given in Table A.7.4.1.x1.1-1.

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

a. The NTA offset value (in Tc units) is 13792

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

3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.x1.2-1

**Table A.7.4.1.x1.2-1 Adjustment Value for DL Timing**

|  |  |  |
| --- | --- | --- |
| **SCS of SSB signals (kHz)** | **Adjustment Value** | |
|  | **Test1** | **Test2** |
| 120 | +8\*64Tc | +4\*64Tc |
| 480 | +4\*64Tc | +2\*64Tc |
| 960 | +4\*64Tc | +2\*64Tc |

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

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

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

### < End of change 22, R4-2214985>

### < Start of change 23, R4-2214985>

A.7.4.3.X1 SA FR2-2 timing advance adjustment accuracy

A.7.4.3.X1.1 Test Purpose and Environment

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

A.7.4.3.X1.2 Test Parameters

Supported test configurations are shown in table A.7.4.3.X1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.7.4.3.X1.2-2, A.7.4.3.X1.2-3 and A.7.4.3.X1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.4.3.X1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

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

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.4.3.X1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

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

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

**Table A.7.4.3.X1.2-1: Timing advance supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.7.4.3.X1.2-2: General test parameters for timing advance**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF channel number |  | 1 |  |
| Initial DL BWP |  | DLBWP.0.1 | As specified in Table A.3.9.2.1-1 |
| Dedicated DL BWP |  | DLBWP.1.1 | As specified in Table A.3.9.2.2-1 |
| Initial UL BWP |  | ULBWP.0.1 | As specified in Table A.3.9.3.1-1 |
| Dedicated UL BWP |  | ULBWP.1.1 | As specified in Table A.3.9.3.2-1 |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA\_new = NTA\_old* for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *For 120 kHz SCS NTA\_new = NTA\_old + 1024\*Tc*  *For 480 kHz SCS NTA\_new = NTA\_old + 256\*Tc*  *For 960 kHz SCS NTA\_new = NTA\_old + 128\*Tc*  (based on equation in clause 4.2 of TS 38.213 [3]) |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

**Table A.7.4.3.X1.2-3: Cell specific test parameters for timing advance**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **T1** | | **T2** | |
| TDD configuration |  | 1 | | TBD | | |
|  | 2 | | TBD | | |
|  | 3 | | TBD | | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | | |
| 2 | 400: NRB,c = 66 | | | |
| 3 | 400: NRB,c = 33 | | | |
| Data RBs allocated |  | 1 | 66 | | | |
|  | 2 | 66 | | | |
|  | 3 | 33 | | | |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | | |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 | | | |
| TRS Configuration |  | 1 | TRS.2.1 TDD | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| PDSCH/PDCCH TCI state |  | 1,2,3 | TCI.State.2 | | | |
| DRx Cycle | ms | 1,2,3 | N/A | | | DRX.8Note5 |
| PDSCH Reference measurement channel |  | 1 | SR.3. 3 TDD | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| RMSI CORESET Reference Channel |  | 1 | CR.3. 2 TDD | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| Dedicated CORESET Reference Channel |  | 1 | CCR.3. 7 TDD | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| OCNG Patterns |  | 1,2,3 | OP.1 | | | |
| SSB Configuration |  | 1 | SSB.4 FR2 | | | |
|  | 2 | TBD | | | |
|  | 3 | TBD | | | |
| SMTC Configuration |  | 1,2,3 | SMTC.1 | | | |

**Table A.7.4.3.X1.2-3A: OTA related test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **T1** | **T2** |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 6 |  | 1,2,3 | Fine | |
| Note1 | dBm/15kHzNote4 |  | -112 | |
| Note1 | dBm/SCSNote3 | 1 | -100 | |
|  | 2 | -94 | |
|  | 3 | -91 | |
|  | dB | 1,2,3 | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | 1 | -96 | |
|  | 2 | -90 | |
|  | 3 | -87 | |
|  | dB | 1,2,3 | 4 | |
| IoNote2 | dBm/95.04 MHz Note4 | 1 | -68.5 | |
| dBm/380.16 MHz Note4 | 2,3 | -62.5 | |
| 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 B\_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: 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.7.4.3.X1.2-4: Sounding Reference Symbol Configuration for timing advance**

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| c-SRS | 16 | Frequency hopping is disabled |
| b-SRS | 0 |  |
| b-hop | 0 |  |
| freqDomainPosition | 0 | Frequency domain position of SRS |
| freqDomainShift | 0 |  |
| groupOrSequenceHopping | neither | No group or sequence hopping |
| SRS-PeriodicityAndOffset | sl5=0 | Once every 5 slots |
| pathlossReferenceRS | ssb-Index=0 | SSB #0 is used for SRS path loss estimation |
| usage | Codebook | Codebook based UL transmission |
| startPosition | 0 | resourceMapping setting. SRS on last symbol of slot, and 1symbols for SRS without repetition. |
| nrofSymbols | n1 |  |
| repetitionFactor | n1 |  |
| combOffset-n2 | 0 | transmissionComb setting |
| cyclicShift-n2 | 0 |  |
| nrofSRS-Ports | port1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 38.331 [2]. | | |

A.7.4.3.X1.3 Test Requirements

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

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

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

### < End of change 23, R4-2214985>

### < Start of change 24, R4-2214986>

##### A.7.5.6.1.X1 NR FR2-2- NR FR2-2 DL active BWP switch of SCell with non-DRX in SA

A.7.5.6.1.X1.1 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.7.5.6.1.X1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.1.X1.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.X1.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.X1.1-4 below.

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

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

Before the test starts,

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

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

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

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

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

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

All cells have constant signal levels throughout the test.

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

During T1,

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

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

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

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

During T3,

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

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

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

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

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

Table A.7.5.6.1.X1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.7.5.6.1.X1.1-2: 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 PSCC. |
| 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.7.5.6.1.X1.1-3: NR Cell specific test parameters for DL BWP switch in SA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell2** |
| Frequency Range |  | 1,2,3 | FR2-2 | FR2-2 |
| Duplex mode |  | 1,2,3 | TDD | |
| TDD configuration |  | 1 | TDDConf.3.1 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| BWchannel |  | 1 | 100 MHz: NRB,c = 66 | |
|  | 2 | 400 MHz: NRB,c = 66 | |
|  | 3 | 400 MHz: NRB,c = 33 | |
| Active BWP ID |  | 1,2,3 | 0 | 0 |
| Downlink initial BWP Configuration |  | 1,2,3 | DLBWP.0.2 | |
| Uplink initial BWP Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Downlink active BWP-0 Configuration |  | 1,2,3 | DLBWP.0.2 | N.A. |
| Downlink active BWP-1 Configuration |  | 1,2,3 | N.A. | DLBWP.1.1 |
| Downlink active BWP-2 Configuration |  | 1,2,3 | N.A. | DLBWP.1.3 |
| Uplink active BWP-0 Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Uplink active BWP-1 Configuration |  | 1,2,3 | N.A. | N.A. |
| Uplink active BWP-2 Configuration |  | 1,2,3 | N.A. | N.A. |
| PDSCH Reference measurement channel |  | 1 | SR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TCI state |  | 1,2,3 | TCI.State.0 | |
| RMSI CORESET parameters |  | 1 | CR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| Dedicated CORESET parameters |  | 1 | CCR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| OCNG Patterns |  | 1,2,3 | OP.1 | |
| SSB Configuration |  | 1 | SSB.1 FR2 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| SMTC Configuration |  | 1,2,3 | 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) |  |  |  |  |
| 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. | | | | |

Table A.7.5.6.1.X1.1-4: OTA related test parameters for BWP switching test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 defined in clause A.3.15.1 | Setup 1 defined in clause A.3.15.1 |
| Assumtion for UE beams Note 6 |  | 1,2,3 | Fine | Fine |
| Note1 | dBm/15kHz |  | -112 | -112 |
| Note1 | dBm/SCS | 1 | -103 | -103 |
| 2 | -97 | -97 |
| 3 | -94 | -94 |
| SS-RSRPNote2 | dBm/SCS Note3 | 1 | -85 | -85 |
| 2 | -79 | -79 |
| 3 | -76 | -76 |
|  | dB |  | 18 | 18 |
| IoNote4 | dBm/95.04 MHz Note4 | 1 | -56 | -56 |
| dBm/380.16 MHz Note4 | 2,3 | -50.0 | -50.0 |
| 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 Noc 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 beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

A.7.5.6.1.X1.2 Test Requirements

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

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

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

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

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

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

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

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

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

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

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

### < End of change 24, R4-2214986>

### < Start of change 25, R4-2214986>

A.7.5.6.2.X1 NR FR2-2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.2.X1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.7.5.6.2.X1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.6.2.X1.1-2. Cell-specific parameters of PCell are specified in Table A.7.5.6.2.X1.1-3 below.

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

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

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

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

All cells have constant signal levels throughout the test.

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

During T1,

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

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

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

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

Table A.7.5.6.2.X1.1-1: DL BWP switch supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.7.5.6.2.X1.1-2: General test parameters for DL BWP switch in SA**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| T1 | s | [0.2] |  |

**Table A.7.5.6.2.X1.1-3: NR Cell specific test parameters for DL BWP switch in SA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell2** |
| Frequency Range |  | 1,2,3 | FR2-2 | FR2-2 |
| Duplex mode |  | 1,2,3 | TDD | |
| TDD configuration |  | 1 | TDDConf.3.1 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| BWchannel |  | 1 | 100 MHz: NRB,c = 66 | |
|  | 2 | 400 MHz: NRB,c = 66 | |
|  | 3 | 400 MHz: NRB,c = 33 | |
| Active BWP ID |  | 1,2,3 | 0 | 0 |
| Downlink initial BWP Configuration |  | 1,2,3 | DLBWP.0.2 | |
| Uplink initial BWP Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Downlink active BWP-0 Configuration |  | 1,2,3 | DLBWP.0.2 | N.A. |
| Downlink active BWP-1 Configuration |  | 1,2,3 | N.A. | DLBWP.1.1 |
| Downlink active BWP-2 Configuration |  | 1,2,3 | N.A. | DLBWP.1.3 |
| Uplink active BWP-0 Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Uplink active BWP-1 Configuration |  | 1,2,3 | N.A. | N.A. |
| Uplink active BWP-2 Configuration |  | 1,2,3 | N.A. | N.A. |
| PDSCH Reference measurement channel |  | 1 | SR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TCI state |  | 1,2,3 | TCI.State.0 | |
| RMSI CORESET parameters |  | 1 | CR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| Dedicated CORESET parameters |  | 1 | CCR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| OCNG Patterns |  | 1,2,3 | OP.1 | |
| SSB Configuration |  | 1 | SSB.1 FR2 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| SMTC Configuration |  | 1,2,3 | 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) |  |  |  |  |
| 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. | | | | |

Table A.7.5.6.2.X1.1-4: OTA related test parameters for BWP switching test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 defined in clause A.3.15.1 | Setup 1 defined in clause A.3.15.1 |
| Assumtion for UE beams Note 6 |  | 1,2,3 | Fine | Fine |
| Note1 | dBm/15kHz |  | -112 | -112 |
| Note1 | dBm/SCS | 1 | -103 | -103 |
| 2 | -97 | -97 |
| 3 | -94 | -94 |
| SS-RSRPNote2 | dBm/SCS Note3 | 1 | -85 | -85 |
| 2 | -79 | -79 |
| 3 | -76 | -76 |
|  | dB |  | 18 | 18 |
| IoNote4 | dBm/95.04 MHz Note4 | 1 | -56 | -56 |
| dBm/380.16 MHz Note4 | 2,3 | -50.0 | -50.0 |
| 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 Noc 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 beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

A.7.5.6.2.X1.2 Test Requirements

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

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

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

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

### < End of change 25, R4-2214986>

### < Start of change 26, R4-2214986>

A.7.5.6.5.X1 NR FR2-2 Active BWP switch on multiple SCells with non-DRX in SA

A.7.5.6.5.X1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for simultaneous RRC-based BWP switch on multiple CCs defined in clause 8.6.3A.

The supported test configurations are shown in Table A.7.5.6.5.X1.1-1. The test scenario comprises one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.5.X1.1-2. NR cell-specific parameters are provided in Table A.7.5.6.5.X1.1-3, and OTA related test parameters in Table A.7.5.6.5.X1.1-4.

PDCCHs indicating new transmissions shall be transmitted in PCell and SCell throughout to ensure that UE sends ACK/NACKs for PDSCH reception in PCell, SCell.

Before the test starts,

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

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell1 (PCell), Cell 2 (SCell).

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition on Cell1 (PCell), Cell 2 (SCell).

All cells have constant signal levels throughout the test.

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

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration in Cell1 and Cell2, sent from the test equipment to the UE, is received at the UE side in PCell’s slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition in Cell1 and Cell2.

The UE shall be able to receive PDSCH on Cell 1 and Cell 2 at the beginning of the DL slot right after PCell’s DL slot (*i+*) as defined in clause 8.6.3A and be ready for the reception of uplink grant for the PCell no later than at the beginning of the DL slot right after slot (*i+*). The UE shall be continuously scheduled on Cell 1’s BWP-1and Cell 2’s BWP-1 starting from the beginning of the DL slot right after slot (*i+*).

*TRRCprocessingDelay* , *TBWPswitchDelayRRC* and *DRRC* are defined in clause 8.6.3A.

The test equipment verifies the DL BWP switch time in Cell 1 and Cell 2 by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when RRC Reconfiguration Complete message is received.

**Table A.7.5.6.5.X1.1-1: DL BWP switch supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | NR TDD, SSB SCS 480 kHz, data SCS 480 kHz, BW 400 MHz |
| 3 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.7.5.6.5.X1.1-2: 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 |  |
| Cell2 timing offset to Cell1 | μs | 0 | Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. |
| T1 | s | [0.2] | During T1, RRC-based simultaneous BWP switching of PCell and SCell is carried out. |

**Table A.7.5.6.5.X1.1-3: NR Cell specific test parameters for DL BWP switch in SA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell2** |
| Frequency Range |  | 1,2,3 | FR2-2 | FR2-2 |
| Duplex mode |  | 1,2,3 | TDD | |
| TDD configuration |  | 1 | TDDConf.3.1 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| BWchannel |  | 1 | 100 MHz: NRB,c = 66 | |
|  | 2 | 400 MHz: NRB,c = 66 | |
|  | 3 | 400 MHz: NRB,c = 33 | |
| Active BWP ID |  | 1,2,3 | 0 | 0 |
| Downlink initial BWP Configuration |  | 1,2,3 | DLBWP.0.2 | |
| Uplink initial BWP Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Downlink active BWP-0 Configuration |  | 1,2,3 | DLBWP.0.2 | N.A. |
| Downlink active BWP-1 Configuration |  | 1,2,3 | N.A. | DLBWP.1.1 |
| Downlink active BWP-2 Configuration |  | 1,2,3 | N.A. | DLBWP.1.3 |
| Uplink active BWP-0 Configuration |  | 1,2,3 | ULBWP.0.2 | N.A. |
| Uplink active BWP-1 Configuration |  | 1,2,3 | N.A. | N.A. |
| Uplink active BWP-2 Configuration |  | 1,2,3 | N.A. | N.A. |
| PDSCH Reference measurement channel |  | 1 | SR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| TCI state |  | 1,2,3 | TCI.State.0 | |
| RMSI CORESET parameters |  | 1 | CR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| Dedicated CORESET parameters |  | 1 | CCR.3.1 TDD | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| OCNG Patterns |  | 1,2,3 | OP.1 | |
| SSB Configuration |  | 1 | SSB.1 FR2 | |
|  | 2 | TBD | |
|  | 3 | TBD | |
| SMTC Configuration |  | 1,2,3 | 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) |  |  |  |  |
| 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. | | | | |

**Table A.7.5.6.3.1.1-4: OTA related test parameters for BWP switching test case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | Cell 2 |
| Angle of arrival configuration |  | 1,2,3 | Setup 1 defined in clause A.3.15.1 | Setup 1 defined in clause A.3.15.1 |
| Assumtion for UE beams Note 6 |  | 1,2,3 | Fine | Fine |
| Note1 | dBm/15kHz |  | -112 | -112 |
| Note1 | dBm/SCS | 1 | -103 | -103 |
| 2 | -97 | -97 |
| 3 | -94 | -94 |
| SS-RSRPNote2 | dBm/SCS Note3 | 1 | -85 | -85 |
| 2 | -79 | -79 |
| 3 | -76 | -76 |
|  | dB |  | 18 | 18 |
| IoNote4 | dBm/95.04 MHz Note4 | 1 | -56 | -56 |
| dBm/380.16 MHz Note4 | 2,3 | -50.0 | -50.0 |
| 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 Noc 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 beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

A.7.5.6.5.X1.2 Test Requirements

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

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

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

### < End of change 26, R4-2214986>

### < Start of change 27, R4-2214997>

### A.7.6X.1 Intra-frequency Measurements

#### A.7.6X.1.1 SA event triggered reporting test without gap under non-DRX

##### A.7.6X.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6X.1.1.1-1.

Table A.7.6X.1.1.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6X.1.1.1-2, A.7.6X.1.1.1-3 and A.7.6X.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6X.1.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1,2,3 | PCell (Cell 1) |  |
| Neighbour cell |  | 1,2,3 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1,2,3 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1,2,3 | SMTC.1 |  |
| A3-Offset | dB | 1,2,3 | -11 |  |
| CP length |  | 1,2,3 | Normal |  |
| Hysteresis | dB | 1,2,3 | 0 |  |
| Time To Trigger | s | 1,2,3 | 0 |  |
| Filter coefficient |  | 1,2,3 | 0 | L3 filtering is not used |
| DRX |  | 1,2,3 | OFF |  |
| Time offset between Cell 1 and Cell 2 |  | 1,2,3 | 3 μs | Synchronous cells |
| T1 | s | 1,2,3 | 5 |  |
| T2 | s | 1,2,3 | 5 |  |

Table A.7.6X.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated |  | 1 | 66 | | 66 | |
| 2 | 66 | | 66 | |
| 3 | 33 | | 33 | |
| Intial BWP configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1,2,3 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1,2,3 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1,2,3 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2,3 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2,3 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2,3 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1,2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1,2,3 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2,3 | 120 | | 120 | |
| OCNG Patterns |  | 1,2,3 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1,2,3 | N/A | | 16 | |
| SSB |  | 1 | SSB.1 FR2 | | SSB.7 FR2 | |
| 2 | SSB.9 FR2 | | SSB.15 FR2 | |
| 3 | SSB.10 FR2 | | SSB.16 FR2 | |
| Propagation Condition |  | 1, 2,3 | AWGN | | AWGN | |

Table A.7.6X.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| AoA setup |  | 1,2,3 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam assumptionNote 4 |  | 1,2,3 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -89 | -89 | | -Infinity | -89 |
| 2 | -83 | -83 | | -Infinity | -83 |
| 3 | -80 | -80 | | -Infinity | -80 |
| BB Note 5 | dB | 1, 2,3 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -89 | -89 | -Infinity | | -89 |
| 2 | -83 | -83 | -Infinity | | -83 |
|  | 3 | -80 | -80 | -Infinity | | -80 |
|  | dBm/95.04MHz | 1,2,3 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1, 2,3 | Defined in Figure A.7.6.1.1.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |



Figure A.7.6X.1.1.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6X.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1，

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 2，

- 3.6s (120\*20ms+60\*20ms) for a UE supporting power class 1,

- 2.16s (72\*20ms+36\*20ms) for a UE supporting power class 2 and 3

For Configuration 3，

- 4.8s (180\*20ms+60\*20ms) for a UE supporting power class 1,

- 2.88s (108\*20ms+36\*20ms) for a UE supporting power class 2 and 3

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

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

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

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.7.6X.1.2 SA event triggered reporting test without gap under DRX

##### A.7.6X.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6X.1.2.1-1.

Table A.7.6X.1.2.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6X.1.2.1-2 ~ 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

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.7.6X.1.2.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1, 2,3 | PCell (Cell 1) | |  |
| Neighbour cell |  | 1, 2,3 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1, 2,3 | 1: Cell 1 and Cell 2 | | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1, 2,3 | SMTC.1 | |  |
| A3-Offset | dB | 1, 2,3 | -6 | |  |
| CP length |  | 1, 2,3 | Normal | |  |
| Hysteresis | dB | 1, 2,3 | 0 | |  |
| Time To Trigger | s | 1, 2,3 | 0 | |  |
| Filter coefficient |  | 1, 2,3 | 0 | | L3 filtering is not used |
| DRX |  | 1, 2,3 | DRX.1 | DRX.7 | DRX related parameters are defined in Table A.7.6.1.2.1-5 |
| Time offset between Cell 1 and Cell 2 |  | 1, 2,3 | 3 μs | | Synchronous cells |
| T1 | s | 1, 2,3 | 5 | |  |
| T2 | s | 1, 2,3 | 10 | 52 |  |

Table A.7.6X.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated |  | 1 | 66 | | 66 | |
| 2 | 66 | | 66 | |
| 3 | 33 | | 33 | |
| Intial BWP configuration |  | 1, 2,3 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2,3 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2,3 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2,3 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2,3 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2,3 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2,3 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2,3 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2,3 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2,3 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.1 FR2 | | SSB.7 FR2 | |
| 2 | SSB.9 FR2 | | SSB.15 FR2 | |
| 3 | SSB.10 FR2 | | SSB.16 FR2 | |
| Propagation Condition |  | 1, 2,3 | AWGN | | AWGN | |

Table A.7.6X.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | 1, 2,3 | Setup 1 defined in A.3.15.1 | | | |
| Beam assumptionNote 4 |  | 1,2,3 | Rough | | Rough | |
| BB Note 5 | dB | 1, 2,3 | 3.77 | -1.52 | -Infinity | -1.52 |
| Note 2 | dBm/15 KHz | 1, 2,3 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| 2 | -83 | | | |
|  |  | 3 | -80 | | | |
| SSB\_RP | dBm/SCS | 1 | -85 | -85 | -Infinity | -85 |
| 2 | -79 | -79 | -Infinity | -79 |
| 3 | -76 | -76 | -Infinity | -76 |
|  | dB | 1, 2,3 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1, 2,3 | -54.53 | -52.18 | See Cell 1 columns | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.7.6X.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 2,

- 10.8s (120\*40ms\*1.5 +60\*40ms\*1.5) for a UE supporting power class 1,

- 6.48s (72\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

For Configuration 3,

- 14.4s (180\*40ms\*1.5 + 60\*40ms\*1.5) for a UE supporting power class 1,

- 8.64s (108\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 2,

- 115.2s (120\*640ms +60\*640ms) for a UE supporting power class 1,

- 69.12s (72\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

For Configuration 3,

- 153.6s (180\*640ms + 60\*640ms) for a UE supporting power class 1,

- 92.16s (108\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

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

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

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

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.7.6X.1.3 SA event triggered reporting test with per-UE gaps under non-DRX

##### A.7.6X.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6X.1.3.1-1.

Table A.7.6X.1.3.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6X.1.3.1-2 ~ 4 below.

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

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6X.1.3.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1,2,3 | PCell (Cell 1) |  |
| Neighbour cell |  | 1,2,3 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1,2,3 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Gap type |  | 1,2,3 | Per-UE gaps |  |
| Measurement gap repitition periodicity | ms | 1,2,3 | 40 |  |
| Measurement gap length | ms | 1,2,3 | 6 |  |
| Measurement gap offset | ms | 1,2,3 | 39 |  |
| SMTC configuration |  | 1,2,3 | SMTC.1 |  |
| CSI-RS parameters |  | 1,2,3 | CSI-RS.3.2 TDD |  |
| A3-Offset | dB | 1,2,3 | -11 |  |
| CP length |  | 1,2,3 | Normal |  |
| Hysteresis | dB | 1,2,3 | 0 |  |
| Time To Trigger | s | 1,2,3 | 0 |  |
| Filter coefficient |  | 1,2,3 | 0 | L3 filtering is not used |
| DRX |  | 1,2,3 | OFF |  |
| Time offset between Cell 1 and Cell 2 |  | 1,2,3 | 3 μs | Synchronous cells |
| T1 | s | 1, 2,3 | 5 |  |
| T2 | s | 1, 2,3 | 5 |  |

Table A.7.6X.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated |  | 1 | 66 | | 66 | |
| 2 | 66 | | 66 | |
| 3 | 33 | | 33 | |
| Intial BWP configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1,2,3 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1,2,3 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1,2,3 | CSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2,3 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2,3 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2,3 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1,2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1,2,3 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2,3 | 120 | | 120 | |
| OCNG Patterns |  | 1,2,3 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1,2,3 | N/A | | 16 | |
| SSB |  | 1 | SSB.1 FR2 | | SSB.7 FR2 | |
| 2 | SSB.9 FR2 | | SSB.15 FR2 | |
| 3 | SSB.10 FR2 | | SSB.16 FR2 | |
| Propagation Condition |  | 1, 2,3 | AWGN | | AWGN | |

Table A.7.6X.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
| T1 | T2 | T1 | | T2 |
| AoA setup |  | 1, 2,3 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 4 |  | 1,2,3 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -89 | -89 | | -Infinity | -89 |
| 2 | -83 | -83 | | -Infinity | -83 |
| 3 | -80 | -80 | | -Infinity | -80 |
| BB Note 5 | dB | 1,2,3 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -89 | -89 | -Infinity | | -89 |
| 2 | -83 | -83 | -Infinity | | -83 |
| 3 | -80 | -80 | -Infinity | | -80 |
|  | dBm/95.04MHz | 1,2,3 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1,2,3 | Defined in Figure A.7.6.1.3.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |



Figure A.7.6X.1.3.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6X.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1，

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 2，

- 7.2s (120\*40ms+60\*40ms) for a UE supporting power class 1,

- 4.32s (72\*40ms+36\*40ms) for a UE supporting power class 2 and 3

For Configuration 3，

- 9.6s (180\*40ms+60\*40ms) for a UE supporting power class 1,

- 5.76s (108\*40ms+36\*40ms) for a UE supporting power class 2 and 3

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

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

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

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.7.6X.1.4 SA event triggered reporting test with per-UE gaps under DRX

##### A.7.6X.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6X.1.4.1-1.

Table A.7.6X.1.4.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6X.1.4.1-2, A.7.6X.1.4.1-3 and A.7.6X.1.4.1-4 below.

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

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

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.7.6X.1.4.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | | Comment |
|  |  |  | Test 1 | Test 2 |  |
| Active cell |  | 1,2,3 | PCell (Cell 1) | |  |
| Neighbour cell |  | 1,2,3 | Cell 2 | | Cell to be identified. |
| RF Channel Number |  | 1,2,3 | 1: Cell 1 and Cell 2 | | One TDD carrier frequency is used for the NR cells. |
| Gap type |  | 1,2,3 | Per-UE gaps | |  |
| Measurement gap repitition periodicity | ms | 1,2,3 | 40 | |  |
| Measurement gap length | ms | 1,2,3 | 6 | |  |
| Measurement gap offset | ms | 1,2,3 | 39 | |  |
| SMTC configuration |  | 1,2,3 | SMTC.1 | |  |
| CSI-RS parameters |  | 1,2,3 | CSI-RS.3.2 TDD | |  |
| A3-Offset | dB | 1,2,3 | -6 | |  |
| CP length |  | 1,2,3 | Normal | |  |
| Hysteresis | dB | 1,2,3 | 0 | |  |
| Time To Trigger | s | 1,2,3 | 0 | |  |
| Filter coefficient |  | 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | 1,2,3 | DRX.1 | DRX.7 | DRX related parameters are defined in Table A.7.6X.1.2.1-5 |
| Time offset between Cell 1 and Cell 2 |  | 1,2,3 | 3 μs | | Synchronous cells |
| T1 | s | 1,2,3 | 5 | |  |
| T2 | s | 1,2,3 | 10 | 52 |  |

Table A.7.6X.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated |  | 1 | 66 | | 66 | |
| 2 | 66 | | 66 | |
| 3 | 33 | | 33 | |
| Intial BWP configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1,2,3 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1,2,3 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1,2,3 | CSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| 2,3 | SR.3.3 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| 2,3 | CR.3.2 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| 2,3 | CCR.3.7 TDD | | N/A | |
| TRS configuration |  | 1, 2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state |  | 1, 2,3 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2,3 | 120 | | 120 | |
| OCNG Patterns |  | 1, 2,3 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.11 FR2 | | SSB.11 FR2 | |
|  |  | 2,3 | SSB.12 FR2 | | SSB.12 FR2 | |
| Propagation Condition |  | 1, 2,3 | AWGN | | AWGN | |

Table A.7.6X.1.4.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| AoA setup |  | 1, 2,3 | Setup 1 defined in A.3.15.1 | | | |
| Beam AssumptionNote 4 |  | 1,2,3 | Rough | | | |
| BB Note 5 | dB | 1, 2,3 | 3.77 | -1.52 | -Infinity | -1.52 |
| Note 2 | dBm/15 KHz | 1, 2,3 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
| 2 | -83 | | | |
| 3 | -80 | | | |
| SSB\_RP | dBm/SCS | 1 | -85 | -85 | -Infinity | -85 |
| 2 | -79 | -79 | -Infinity | -79 |
| 3 | -76 | -76 | -Infinity | -76 |
|  | dB | 1, 2,3 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1,2,3 | -54.53 | -52.18 | See Cell 1 columns | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | |

##### A.7.6X.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 2,

- 10.8s (120\*40ms\*1.5 +60\*40ms\*1.5) for a UE supporting power class 1,

- 6.48s (72\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

For Configuration 3,

- 14.4s (180\*40ms\*1.5 + 60\*40ms\*1.5) for a UE supporting power class 1,

- 8.64s (108\*40ms\*1.5 + 36\*40ms\*1.5) for a UE supporting power class 2 and 3

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

- TBD for a UE supporting power class 1,

- TBD for a UE supporting power class 2 and 3

For Configuration 2,

- 115.2s (120\*640ms +60\*640ms) for a UE supporting power class 1,

- 69.12s (72\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

For Configuration 3,

- 153.6s (180\*640ms + 60\*640ms) for a UE supporting power class 1,

- 92.16s (108\*640ms + 36\*640ms) for a UE supporting power class 2 and 3

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

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

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

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.7.6X.1.5 SA event triggered reporting test with SSB time index detection without gap under non-DRX

##### A.7.6X.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6X.1.1.1-1.

Table A.7.6X.1.1.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6X.1.1.1-2, A.7.6X.1.1.1-3 and A.7.6X.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6X.1.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1 | PCell (Cell 1) |  |
| Neighbour cell |  | 1 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| SMTC configuration |  | 1 | SMTC.1 |  |
| A3-Offset | dB | 1 | -11 |  |
| CP length |  | 1 | Normal |  |
| Hysteresis | dB | 1 | 0 |  |
| Time To Trigger | s | 1 | 0 |  |
| Filter coefficient |  | 1 | 0 | L3 filtering is not used |
| DRX |  | 1 | OFF |  |
| Time offset between Cell 1 and Cell 2 |  | 1 | 3 μs | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 5 |  |

Table A.7.6X.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
| Intial BWP configuration |  | 1 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 120 | | 120 | |
| OCNG Patterns |  | 1 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1 | N/A | | 16 | |
| SSB |  | 1 | SSB.10 FR2 | | SSB.16 FR2 | |
|  |  |
| Propagation Condition |  | 1 | AWGN | | AWGN | |

Table A.7.6X.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| AoA setup |  | 1 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam assumptionNote 4 |  | 1 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -80 | -80 | | -Infinity | -80 |
|  |  |
| BB Note 5 | dB | 1 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -80 | -80 | -Infinity | | -80 |
|  |  |
|  | dBm/95.04MHz | 1 | -64.41 | -64.41 | -Infinity | | -64.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1 | Defined in Figure A.7.6X.1.1.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |



Figure A.7.6X.1.1.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6X.1.5.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 6.24s (180\*20ms + 60\*20ms +72\*20ms) for a UE supporting power class 1,

- 3.84s (108\*20ms + 36\*20ms +48\*20ms) for a UE supporting power class 2 and 3

The UE is required to read the neighbour cell SSB index in this test.

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

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

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.7.6X.1.6 SA event triggered reporting test with SSB time index detection with per-UE gaps under non-DRX

##### A.7.6X.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6X.1.3.1-1.

Table A.7.6X.1.3.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6X.1.3.1-2 ~ 4 below.

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

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6X.1.3.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1 | PCell (Cell 1) |  |
| Neighbour cell |  | 1 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1 | 1: Cell 1 and Cell 2 | One TDD carrier frequency is used for the NR cells. |
| Gap type |  | 1 | Per-UE gaps |  |
| Measurement gap repitition periodicity | ms | 1 | 40 |  |
| Measurement gap length | ms | 1 | 6 |  |
| Measurement gap offset | ms | 1 | 39 |  |
| SMTC configuration |  | 1 | SMTC.1 |  |
| CSI-RS parameters |  | 1 | CSI-RS.3.2 TDD |  |
| A3-Offset | dB | 1 | -11 |  |
| CP length |  | 1 | Normal |  |
| Hysteresis | dB | 1 | 0 |  |
| Time To Trigger | s | 1 | 0 |  |
| Filter coefficient |  | 1 | 0 | L3 filtering is not used |
| DRX |  | 1 | OFF |  |
| Time offset between Cell 1 and Cell 2 |  | 1 | 3 μs | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 5 |  |

Table A.7.6X.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Data RBs allocated |  | 1 | 24 | | 24 | |
| 2 | 48 | | 48 | |
| Intial BWP configuration |  | 1 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.2 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.2 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | CSI-RS | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.2 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | N/A | |
| N/A | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | N/A | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1 | TCI.State.2 | | N/A | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1 | 120 | | 120 | |
| OCNG Patterns |  | 1 | OP.5 | | N/A | |
| cellIndividualOffset | dB | 1 | N/A | | 16 | |
| SSB |  | 1 | SSB.12 FR2 | | SSB.16 FR2 | |
|  |  |
| Propagation Condition |  | 1 | AWGN | | AWGN | |

Table A.7.6X.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | | |
| T1 | T2 | T1 | | T2 |
| AoA setup |  | 1 | Setup 3 defined in A.3.15.3 | | | | |
|  |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 4 |  | 1 | Rough | | Rough | | |
| Es | dBm/SCS | 1 | -80 | -80 | | -Infinity | -80 |
|  |  |
| BB Note 5 | dB | 1 | -0.12 | -0.12 | | -Infinity | -0.12 |
| SSB\_RP | dBm/SCS | 1 | -80 | -80 | -Infinity | | -80 |
|  |  |
|  | dBm/95.04MHz | 1 | -61.41 | -61.41 | -Infinity | | -61.41 |
| Time multiplexing of the downlink transmissions from each AoA | | 1 | Defined in Figure A.7.6X.1.3.1-1 | | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Void  Note 3: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 5: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBP from TS 38.101-2 [19] Table 6.2.1.3-4. | | | | | | | |



Figure A.7.6X.1.3.1-1: Time multiplexed downlink transmissions (Config 1 example)

##### A.7.6X.1.6.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 12.48s (180\*40ms +60\*40ms) for a UE supporting power class 1,

- 7.68s (108\*40ms + 36\*40ms) for a UE supporting power class 2 and 3

The UE is required to read the neighbour cell SSB index in this test.

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

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

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 27, R4-2214997>

### < Start of change 28, R4-2214997>

### A.7.6X.2 Inter-frequency Measurements

#### A.7.6X.2.1 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2-2)

##### A.7.6X.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the 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 FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6X.2.1.1-1, A.7.6X.2.1.1-2, and A.7.6X.2.1.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6X.2.1.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6X.2.1.1-1.

Table A.7.6X.2.1.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.7.6X.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1,2,3 | 1 | Two FR2 NR carrier frequencies 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 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
|  | Config 2 | SSB.11 FR2 |
|  | Config 3 | SSB.12 FR2 |
| offsetMO | dB | Config 1,2,3 | 16 | Applied to NR Cell 2 measurement object |
| A3-Offset | dB | Config 1,2,3 | -11 |  |
| Hysteresis | dB | Config 1,2,3 | 0 |  |
| CP length |  | Config 1,2,3 | Normal |  |
| TimeToTrigger | s | Config 1,2,3 | 0 |  |
| Filter coefficient |  | Config 1,2,3 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 |  |
| T2 | s | Config 1,2,3 | 5.2 for PC1; 3.5 for other PC |  |

Table A.7.6X.2.1.1-3: 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 | Setup 3 as specified in clause A.3.15 | | | | |
|  | |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 7 | |  | 1,2,3 | Rough | | Rough | | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | | |
| Duplex mode | |  | Config 1,2,3 | TDD | | TDD | | |
| TDD configuration | |  | Config 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | | |
| Config 2 | 66 | | 66 | | |
| Config 3 | 33 | | 33 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | | |
| 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 1,2,3 | SR.3.1 TDD | | - | | |
| CORESET Reference Channel | |  | Config 1,2,3 | CR.3.1 TDD | | - | | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,3 | 120 | | 120 | | |
| TRS configuration | |  | Config 1,2,3 | TRS.2.1 TDD | | N/A | | |
| PDSCH/PDCCH TCI state | |  | Config 1,2,3 | TCI.State.2 | | N/A | | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3 | 0 | | 0 | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | | |
| Ês | | dBm/SCS | Config 1 | -87 | -87 | -Infinity | | -87 |
| Config 2 | -81 | -81 | -Infinity | | -81 |
| Config 3 | -78 | -78 | -Infinity | | -78 |
| SSBRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | -87 | -Infinity | | -87 |
| Config 2 | -81 | -81 | -Infinity | | -81 |
| Config 3 | -78 | -78 | -Infinity | | -78 |
| BB Note 8 | | dB | Config 1,2,3 | 1.89 | 1.89 | -Infinity | | 1.89 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | -58.01 | -58.01 | -Infinity | | -58.01 |
| Propagation Condition | |  | Config 1,2,3 | AWGN | | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: VoidNote 3: SSBRP, 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.7.6X.2.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 2,

11.52s (192\*40ms + 96\*40ms) for UE supporting power class 1, or

7.2s (120\*40ms +60\*40ms) for UE supporting other power class.

For Configuration 3,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

The 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.7.6X.2.2 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used (PCell in FR2-2)

##### A.7.6X.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the 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 FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6X.2.2.1-1, A.7.6X.2.2.1-2, and A.7.6X.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6X.2.2.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6X.2.2.1-1.

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.7.6X.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.7.6X.2.2.1-2: 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 | | Two FR2 NR carrier frequencies 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 | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
|  | Config 2 | SSB.11 FR2 | |
|  | Config 3 | SSB.12 FR2 | |
| A3-Offset | dB | Config 1,2,3 | -6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| CP length |  | Config 1,2,3 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 8 for PC1;  5 for other PC | 82 for PC1; 52 for other PC |  |

Table A.7.6X.2.2.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| TDD configuration | |  | Config 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| Duplex mode | |  | Config 1,2,3 | TDD | | TDD | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 66 | | 66 | |
| Config 2 | 66 | | 66 | |
| Config 3 | 33 | | 33 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| 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 1,2,3 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1,2,3 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,3 | 120 | | 120 | |
| TRS configuration | |  | Config 1,2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state | |  | Config 1,2,3 | TCI.State.2 | | N/A | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz Note5 | Config 1,2,3 | -104.7 | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | |
| Config 2 | -89.7 | | -89.7 | |
| Config 3 | -86.7 | | -86.7 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
| Config 2 | -83.7 | -83.7 | -Infinity | -80.7 |
| Config 3 | -80.7 | -80.7 | -Infinity | -77.7 |
|  | | dB | Config 1,2,3 | 6 | 6 | -Infinity | 9 |
|  | | dB | Config 1,2,3 | 6 | 6 | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | -59.7 | -59.7 | -66.7 | -57.2 |
| Propagation Condition | |  | Config 1,2,3 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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: 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.7.6X.2.2.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

For Configuration 1,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 2,

17.28s (192\*40ms\*1.5 + 96\*40ms\*1.5) for UE supporting power class 1, or

10.80s (120\*40ms\*1.5 + 60\*40ms\*1.5) for UE supporting other power class.

For Configuration 3,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

For Configuratiojn 1,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuratiojn 2,

184.32s (192\*640ms + 96\*640ms) for UE supporting power class 1, or

115.20s (120\*640ms + 60\*640ms) for UE supporting other power class.

For Configuratiojn 3,

TBD for UE supporting power class 1, or

TBD 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.7.6X.2.3 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is not used (PCell in FR2-2)

##### A.7.6X.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6X.2.3.1-1, A.7.6X.2.3.1-2, and A.7.6X.2.3.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6X.2.3.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6X.2.3.1-1.

Table A.7.6X.2.3.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.7.6X.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | Two FR2 NR carrier frequencies 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 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| Config 2 | SSB.11 FR2 |
| Config 3 | SSB.12 FR2 |
| offsetMO | dB | Config 1,2,3 | 16 | Applied to NR Cell 2 measurement object |
| A3-Offset | dB | Config 1,2,3 | -11 |  |
| Hysteresis | dB | Config 1,2,3 | 0 |  |
| CP length |  | Config 1,2,3 | Normal |  |
| TimeToTrigger | s | Config 1,2,3 | 0 |  |
| Filter coefficient |  | Config 1,2,3 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 |  |
| T2 | s | Config 1,2,3 | 7 for PC1; 4.5 for other PC |  |

Table A.7.6X.2.3.1-3: 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 | Setup 3 as specified in clause A.3.15 | | | | |
|  | |  |  | AoA1 | | AoA2 | | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | Rough | | Rough | | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | | |
| Duplex mode | |  | Config 1,2,3 | TDD | | TDD | | |
| TDD configuration | |  | Config 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 2 | 400: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 3 | 400: NRB,c = 33 | | 100: NRB,c = 33 | | |
|  | |  | Config 1 | 66 | | 66 | | |
| Config 2 | 66 | | 66 | | |
| Config 3 | 33 | | 33 | | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | | |
| 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 | |  | Config 1,2,3 | OP.1 | | OP.1 | | |
| PDSCH Reference measurement channel | |  | Config 1,2,3 | SR.3.1 TDD | | - | | |
| CORESET Reference Channel | |  | Config 1,2,3 | CR.3.1 TDD | | - | | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,3 | 120 | | 120 | | |
| TRS configuration | |  | Config 1,2,3 | TRS.2.1 TDD | | N/A | | |
| PDSCH/PDCCH TCI state | |  | Config 1,2,3 | TCI.State.2 | | N/A | | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3 | 0 | | 0 | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | | |
| Ês | | dBm/SCS | Config 1 | -87 | -87 | -Infinity | | -87 |
| Config 2 | -81 | -81 | -Infinity | | -81 |
| Config 3 | -78 | -78 | -Infinity | | -78 |
| SSBRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | -87 | -Infinity | | -87 |
| Config 2 | -81 | -81 | -Infinity | | -81 |
| Config 3 | -78 | -78 | -Infinity | | -78 |
| BB Note 8 | | dB | Config 1,2,3 | 1.89 | 1.89 | -Infinity | | 1.89 |
| Io Note3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | -58.01 | -58.01 | -Infinity | | -58.01 |
| Propagation Condition | |  | Config 1,2,3 | AWGN | | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: SBRP, 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.7.6X.2.3.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

For Configuration 1,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 2,

14.4s (192\*40ms + 96\*40ms+72\*40ms) for UE supporting power class 1, or

9.12s (120\*40ms+60\*40ms+48\*40ms) for UE supporting other power class.

For Configuration 3,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

The 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.7.6X.2.4 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is used (PCell in FR2-2)

##### A.7.6X.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6X.2.4.1-1, A.7.6X.2.4.1-2, and A.7.6X.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6X.2.4.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6X.2.4.1-1.

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.7.6X.2.4.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.7.6X.2.4.1-2: 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 | | Two FR2 NR carrier frequencies 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 | 13 | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 39 | |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | | As specified in clause A.3.10.2 |
| Config 2 | SSB.11 FR2 | |
| Config 3 | SSB.12 FR2 | |
| A3-Offset | dB | Config 1,2,3 | -6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| CP length |  | Config 1,2,3 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 11 for PC1; 6.5 for other PC | 108 for PC1; 67 for other PC |  |

Table A.7.6X.2.4.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting with SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1,2,3 | Setup 1 as specified in clause A.3.15 | | | |
| Beam AssumptionNote 7 | |  | Config 1,2,3 | Rough | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1,2,3 | TDD | | TDD | |
| TDD configuration | |  | Config 1,2,3 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
| Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
|  | |  | Config 1 | 66 | | 66 | |
|  | |  | Config 2 | 66 | | 66 | |
|  | |  | Config 3 | 33 | | 33 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
|  | |  | Config 2 | 400: NRB,c = 66 | | 400: NRB,c = 66 | |
|  | |  | Config 3 | 400: NRB,c = 33 | | 400: NRB,c = 33 | |
| 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 | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,2,3 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1,2,3 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,2,3 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,3 | 120 | | 120 | |
| TRS configuration | |  | Config 1,2,3 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI state | |  | Config 1,2,3 | TCI.State.2 | | N/A | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz Note5 |  | -104.7 | | -104.7 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -95.7 | | -95.7 | |
| Config 2 | -89.7 | | -89.7 | |
| Config 3 | -86.7 | | -86.7 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -89.7 | -89.7 | -Infinity | -86.7 |
| Config 2 | -83.7 | -83.7 | -Infinity | -80.7 |
| Config 3 | -80.7 | -80.7 | -Infinity | -77.7 |
|  | | dB | Config 1,2,3 | 6 | 6 | -Infinity | 9 |
|  | | dB | Config 1,2,3 | 6 | 6 | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3 | -59.7 | -59.7 | -66.7 | -57.2 |
| Propagation Condition | |  | Config 1,2,3 | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: 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: 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.7.6X.2.4.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

For Configuration 1,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 2,

21.6s (192\*40ms\*1.5+96\*40ms\*1.5+72\*40ms\*1.5) for UE supporting power class 1, or

13.68s (120\*40ms\*1.5+60\*40ms\*1.5+48\*40ms\*1.5) for UE supporting other power class.

For Configuration 3,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

For Configuration 1,

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 2,

230.4s (192\*640ms+96\*640ms+72\*640ms) for UE supporting power class 1, or

145.92s (120\*640ms+60\*640ms+48\*640ms) for UE supporting other power class.

For Configuration 3,

TBD for UE supporting power class 1, or

TBD 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.7.6X.2.5 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)

##### A.7.6X.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.7.6X.2.5.1-1, A.7.6X.2.5.1-2, and A.7.6X.2.5.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6X.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.7.6X.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.7.6X.2.5.1-1.

Table A.7.6X.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 |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 480 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 960 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 9 | 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.7.6X.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 1,2,3,4,5,6,7,8,9 | 1, 2 | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6,7,8,9 | 0 | Gap not configured | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6,7,8,9 | 39 | N/A |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4,7 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  |  | Config 2,5,8 | SSB.1 FR1 | |
|  |  | Config 3,6,9 | SSB.2 FR1 | |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1,4,7 | TRS.1.1 FDD | |  |
|  | Config 2,5,8 | TRS.1.1 TDD | |  |
|  | Config 3,6,9 | 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 |
| Config 4,5,6 | SSB.11 FR2 | |
| Config 7,8,9 | SSB.12 FR2 | |
| *offsetMO* | dB | Config 1,2,3,4,5,6,7,8,9 | 6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6,7,8,9 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6,7,8,9 | -105 | |  |
| CP length |  | Config 1,2,3,4,5,6,7,8,9 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6,7,8,9 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6,7,8,9 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,4,7 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3,5,6,8,9 | 3μs | | Synchronous cells. |
| 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 | 5.2 for PC1; 3.5 for other PC | 3 for PC1; 2 for other PC |  |

Table A.7.6X.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 1,2,3,4,5,6,7,8,9 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3,4,5,6,7,8,9 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6,7,8,9 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4,7 | FDD | | TDD | |
|  | |  | Config 2,3,5,6,8,9 | TDD | | TDD | |
| TDD configuration | |  | Config 1,4,7 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2,5,8 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3,6,9 | 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 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| Config 4 | 52 | | 66 | |
| Config 5 | 52 | | 66 | |
| Config 6 | 106 | | 66 | |
| Config 7 | 52 | | 33 | |
| Config 8 | 52 | | 33 | |
| Config 9 | 106 | | 33 | |
| 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 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3,4,5,6,7,8,9 | 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 1,2,3,4,5,6,7,8,9 | OP.1 | | OP.1 | |
| PDSCH Reference | |  | Config 1,4,7 | SR.1.1 FDD | | - | |
| measurement channel | |  | Config 2,5,8 | SR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference | |  | Config 1,4,7 | CR.1.1 FDD | | - | |
| Channel | |  | Config 2,5,8 | CR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1,4,7 | CCR.1.1 FDD | | - | |
|  | Config 2,5,8 | CCR.1.1 TDD | |  | |
|  | Config 3,6,9 | CCR.2.1 TDD | |  | |
| SMTC configuration defined | |  | Config 1,4,7 | SMTC.2 | | SMTC.2 | |
| in A.3.11.1 and A.3.11.2 | |  | Config 2,3,5,6,8,9 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,4,5,7,8 | 15 | | 120 | |
|  | |  | Config 3,6,9 | 30 | | 120 | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Ês | | dBm/SCS | Config 1,2,3 |  | | -Infinity | -87 |
| Config 4,5,6 |  | | -Infinity | -81 |
| Config 7,8,9 |  | | -Infinity | -78 |
| SSB\_RP Note 3 | | dBm/SCS  Note5 | Config 1,2,3 |  | | -Infinity | -87 |
| Config 4,5,6 |  | | -Infinity | -81 |
| Config 7,8,9 |  | | -Infinity | -78 |
| BB Note 8 | | dB | Config 1,2,3,4,5,6,7,8,9 | NA  Link only, see clause | | -Infinity | 14.69 |
|  | | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6,7,8,9 | A.3.7A | | -Infinity | -58.01 |
| Propagation Condition | |  | Config 1,2,3,4,5,6,7,8,9 | 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 B\_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.7.6X.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

For Configuration 1,2,3

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

11.52s (192\*40ms+96\*40ms) for UE supporting power class 1, or

7.2s (120\*40ms + 60\*40ms) for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBDfor 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

For Configuration 1,2,3

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

5.76s (192\*20ms+96\*20ms) for UE supporting power class 1, or

3.6s (120\*20ms + 60\*20ms) for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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.7.6X.2.6 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)

##### A.7.6X.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.7.6X.2.6.1-1, A.7.6X.2.6.1-2, and A.7.6X.2.6.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6X.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.7.6X.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.7.6X.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.7.6X.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 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 480 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 960 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 9 | 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.7.6X.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 1,2,3,4,5,6,7,8,9 | 1, 2 | | | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | Gap not configured | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6,7,8,9 | 39 | | N/A | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4,7 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2,5,8 | SSB.1 FR1 | | | |
|  | Config 3,6,9 | SSB.2 FR1 | | | |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1,4,7 | TRS.1.1 FDD | | | |  |
|  | Config 2,5,8 | TRS.1.1 TDD | | | |  |
|  | Config 3,6,9 | 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 |
|  | Config 4,5,6 | SSB.11 FR2 | | | |
|  | Config 7,8,9 | SSB.12 FR2 | | | |
| *offsetMO* | dB | Config 1,2,3,4,5,6,7,8,9 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6,7,8,9 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6,7,8,9 | -105 | | | |  |
| CP length |  | Config 1,2,3,4,5,6,7,7,8,9 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6,7,8,9 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6,7,8,9 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,4,7 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3,5,6,8,9 | 3μs | | | | Synchronous cells. |
| 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 | 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.7.6X.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 1,2,3,4,5,6,7,8,9 | NA | | Setup 1 as specified in clause A.3.15 | |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6,7,8,9 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4,7 | FDD | | TDD | |
|  | |  | Config 2,3,5,6,8,9 | TDD | | TDD | |
| TDD configuration | |  | Config 1,4,7 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2,5,8 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3,6,9 | 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 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| Config 4 | 52 | | 66 | |
| Config 5 | 52 | | 66 | |
| Config 6 | 106 | | 66 | |
| Config 7 | 52 | | 33 | |
| Config 8 | 52 | | 33 | |
| Config 9 | 106 | | 33 | |
| 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 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
|  | | Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3,4,5,6,7,8,9 | 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 1,2,3,4,5,6,7,8,9 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,4,7 | SR.1.1 FDD | | - | |
|  | |  | Config 2,5,8 | SR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference Channel | |  | Config 1,4,7 | CR.1.1 FDD | | - | |
|  | |  | Config 2,5,8 | CR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1,4,7 | CCR.1.1 FDD | | - | |
|  | Config 2,5,8 | CCR.1.1 TDD | |  | |
|  | Config 3,6,9 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,4,7 | SMTC.2 | | SMTC.2 | |
|  | |  | Config 2,3,5,6,8,9 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,4,5,7,8 | 15 | | 120 | |
|  | |  | Config 3,6,9 | 30 | | 120 | |
| EPRE ratio of PSS to SSS | |  | Config 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 | |  |  |  | |  | |
| 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 1,2,3 |  | | -95.7 | |
| Config 4,5,6 |  | | -89.7 | |
| Config 7,8,9 |  | | -86.7 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2,3 |  | | -Infinity | -86.7 |
| Config 4,5,6 |  | | -Infinity | -80.7 |
| Config 7,8,9 |  | | -Infinity | -77.7 |
|  | | dB | Config 1,2,3,4,5,6,7,8,9 |  | | -Infinity | 9 |
|  | | dB | Config 1,2,3,4,5,6,7,8,9 |  | | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6,7,8,9 |  | | -66.7 | -57.2 |
|  | |  | |
|  | |  | |
| Propagation Condition | |  | Config 1,2,3,4,5,6,7,8,9 | 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 | | | | | | | |

##### A.7.6X.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

For Configuration 1,2,3

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

17.28s (192\*40ms\*1.5 + 96\*40ms\*1.5) for UE supporting power class 1, or

10.80s (120\*40ms\*1.5 + 60\*40ms\*1.5) for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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

For Configuration 1,2,3

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

184.32s (192\*640ms + 96\*640ms) for UE supporting power class 1, or

115.20s (120\*640ms + 60\*640ms) for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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.7.6X.2.7 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)

##### A.7.6X.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.

n 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.7.6X.2.7.1-1, A.7.6X.2.7.1-2, and A.7.6X.2.7.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6X.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.7.6X.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.7.6X.2.7.1-1.

Table A.7.6X.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 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 480 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 960 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 9 | 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.7.6X.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 1,2,3,4,5,6,7,8,9 | 1, 2 | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 1 (Pcell) | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 2 | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6,7,8,9 | 0 | Gap not configured | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6,7,8,9 | 39 | N/A |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4,7 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  |  | Config 2,5,8 | SSB.1 FR1 | |
|  |  | Config 3,6,9 | SSB.2 FR1 | |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1,4,7 | TRS.1.1 FDD | |  |
|  | Config 2,5,8 | TRS.1.1 TDD | |  |
|  | Config 3,6,9 | 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 |
| Config 4,5,6 | SSB.11 FR2 | |
| Config 7,8,9 | SSB.12 FR2 | |
| *offsetMO* | dB | Config 1,2,3,4,5,6,7,8,9 | 6 | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6,7,8,9 | 0 | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6,7,8,9 | -105 | |  |
| CP length |  | Config 1,2,3,4,5,6,7,8,9 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6,7,8,9 | 0 | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6,7,8,9 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1,4,7 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3,5,6,8,9 | 3μs | | Synchronous cells. |
| 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 | 5.2 for PC1; 3.5 for other PC | 3 for PC1; 2 for other PC |  |

Table A.7.6X.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 1,2,3,4,5,6,7,8,9 | N/A | | Setup 1 as specified in clause A.3.15 | |
| Beam AssumptionNote 7 | |  | Config 1,2,3,4,5,6,7,8,9 | N/A | | Rough | |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6,7,8,9 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4,7 | FDD | | TDD | |
|  | |  | Config 2,3,5,6,8,9 | TDD | | TDD | |
| TDD configuration | |  | Config 1,4,7 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2,5,8 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3,6,9 | 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 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| Config 4 | 52 | | 66 | |
| Config 5 | 52 | | 66 | |
| Config 6 | 106 | | 66 | |
| Config 7 | 52 | | 33 | |
| Config 8 | 52 | | 33 | |
| Config 9 | 106 | | 33 | |
| 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 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3,4,5,6,7,8,9 | 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 1,2,3,4,5,6,7,8,9 | OP.1 | | OP.1 | |
| PDSCH Reference | |  | Config 1,4,7 | SR.1.1 FDD | | - | |
| measurement channel | |  | Config 2,5,8 | SR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference | |  | Config 1,4,7 | CR.1.1 FDD | | - | |
| Channel | |  | Config 2,5,8 | CR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1,4,7 | CCR.1.1 FDD | | - | |
|  | Config 2,5,8 | CCR.1.1 TDD | |  | |
|  | Config 3,6,9 | CCR.2.1 TDD | |  | |
| SMTC configuration defined | |  | Config 1,4,7 | SMTC.2 | | SMTC.2 | |
| in A.3.11.1 and A.3.11.2 | |  | Config 2,3,5,6,8,9 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,4,5,7,8 | 15 | | 120 | |
|  | |  | Config 3,6,9 | 30 | | 120 | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Ês | | dBm/SCS | Config 1,2,3 |  | | -Infinity | -87 |
| Config 4,5,6 |  | | -Infinity | -81 |
| Config 7,8,9 |  | | -Infinity | -78 |
| SSB\_RP Note 3 | | dBm/SCS  Note5 | Config 1,2,3 |  | | -Infinity | -87 |
| Config 4,5,6 |  | | -Infinity | -81 |
| Config 7,8,9 |  | | -Infinity | -78 |
| BB Note 8 | | dB | Config 1,2,3,4,5,6,7,8,9 | NA  Link only, see clause | | -Infinity | 14.69 |
|  | | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6,7,8,9 | A.3.7A | | -Infinity | -58.01 |
| Propagation Condition | |  | Config 1,2,3,4,5,6,7,8,9 | 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 B\_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.7.6X.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

For Configuration 1,2,3

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

14.4s (192\*40ms+96\*40ms+72\*40ms) for UE supporting power class 1, or

9.12s (120\*40ms + 60\*40ms+48\*40ms) for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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

For Configuration 1,2,3

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

7.2s (192\*20ms+96\*20ms+72\*20ms) for UE supporting power class 1, or

4.56s (120\*20ms + 60\*20ms+48\*20ms) for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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.7.6X.2.8 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)

##### A.7.6X.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.7.6X.2.8.1-1, A.7.6X.2.8.1-2, and A.7.6X.2.8.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6X.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.7.6X.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.7.6X.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.7.6X.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 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 480 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 5 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 7 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 960 kHz SSB SCS,  400 MHz bandwidth, TDD  duplex mode |
| 8 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 9 | 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.7.6X.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 1,2,3,4,5,6,7,8,9 | 1, 2 | | | | One NR FR1 and one NR FR2 carrier frequency is used. |
| Active cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 1 (Pcell) | | | | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6,7,8,9 | NR cell 2 | | | | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | Gap not configured | | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3,4,5,6,7,8,9 | 39 | | N/A | |  |
| SMTC-SSB parameters on NR RF Channel 1 |  | Config 1,4,7 | SSB.1 FR1 | | | | As specified in clause A.3.10.1 |
|  | Config 2,5,8 | SSB.1 FR1 | | | |
|  | Config 3,6,9 | SSB.2 FR1 | | | |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | Config 1,4,7 | TRS.1.1 FDD | | | |  |
|  | Config 2,5,8 | TRS.1.1 TDD | | | |  |
|  | Config 3,6,9 | 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 |
|  | Config 4,5,6 | SSB.11 FR2 | | | |
|  | Config 7,8,9 | SSB.12 FR2 | | | |
| *offsetMO* | dB | Config 1,2,3,4,5,6,7,8,9 | 6 | | | |  |
| Hysteresis | dB | Config 1,2,3,4,5,6,7,8,9 | 0 | | | |  |
| *a4-Threshold* | dBm | Config 1,2,3,4,5,6,7,8,9 | -105 | | | |  |
| CP length |  | Config 1,2,3,4,5,6,7,7,8,9 | Normal | | | |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6,7,8,9 | 0 | | | |  |
| Filter coefficient |  | Config 1,2,3,4,5,6,7,8,9 | 0 | | | | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6,7,8,9 | DRX.1 | DRX.7 | DRX.1 | DRX.7 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1,4,7 | 3ms | | | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3,5,6,8,9 | 3μs | | | | Synchronous cells. |
| 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 | 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.7.6X.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 1,2,3,4,5,6,7,8,9 | NA | | Setup 1 as specified in clause A.3.15 | |
| NR RF Channel Number | |  | Config 1,2,3,4,5,6,7,8,9 | 1 | | 2 | |
| Duplex mode | |  | Config 1,4,7 | FDD | | TDD | |
|  | |  | Config 2,3,5,6,8,9 | TDD | | TDD | |
| TDD configuration | |  | Config 1,4,7 | Not Applicable | | TDDConf.3.1 | |
|  | |  | Config 2,5,8 | TDDConf.1.1 | | TDDConf.3.1 | |
|  | |  | Config 3,6,9 | 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 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| Data RBs allocated | |  | Config 1 | 52 | | 66 | |
| Config 2 | 52 | | 66 | |
| Config 3 | 106 | | 66 | |
| Config 4 | 52 | | 66 | |
| Config 5 | 52 | | 66 | |
| Config 6 | 106 | | 66 | |
| Config 7 | 52 | | 33 | |
| Config 8 | 52 | | 33 | |
| Config 9 | 106 | | 33 | |
| 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 | |
| Config 4 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 5 | 10: NRB,c = 52 | | 400: NRB,c = 66 | |
| Config 6 | 40: NRB,c = 106 | | 400: NRB,c = 66 | |
| Config 7 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
| Config 8 | 10: NRB,c = 52 | | 400: NRB,c = 33 | |
|  | | Config 9 | 40: NRB,c = 106 | | 400: NRB,c = 33 | |
| BWP configuration | Initial DL BWP |  | Config 1,2,3,4,5,6,7,8,9 | 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 1,2,3,4,5,6,7,8,9 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1,4,7 | SR.1.1 FDD | | - | |
|  | |  | Config 2,5,8 | SR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | SR.2.1 TDD | |  | |
| RMSI CORESET Reference Channel | |  | Config 1,4,7 | CR.1.1 FDD | | - | |
|  | |  | Config 2,5,8 | CR.1.1 TDD | |  | |
|  | |  | Config 3,6,9 | CR.2.1 TDD | |  | |
| Dedicated CORESET RMC configuration | |  | Config 1,4,7 | CCR.1.1 FDD | | - | |
|  | Config 2,5,8 | CCR.1.1 TDD | |  | |
|  | Config 3,6,9 | CCR.2.1 TDD | |  | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1,4,7 | SMTC.2 | | SMTC.2 | |
|  | |  | Config 2,3,5,6,8,9 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2,4,5,7,8 | 15 | | 120 | |
|  | |  | Config 3,6,9 | 30 | | 120 | |
| EPRE ratio of PSS to SSS | |  | Config 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 | |  |  |  | |  | |
| 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 1,2,3 |  | | -95.7 | |
| Config 4,5,6 |  | | -89.7 | |
| Config 7,8,9 |  | | -86.7 | |
| SSB\_RP Note 3 | | dBm/SCS Note5 | Config 1,2,3 |  | | -Infinity | -86.7 |
| Config 4,5,6 |  | | -Infinity | -80.7 |
| Config 7,8,9 |  | | -Infinity | -77.7 |
|  | | dB | Config 1,2,3,4,5,6,7,8,9 |  | | -Infinity | 9 |
|  | | dB | Config 1,2,3,4,5,6,7,8,9 |  | | -Infinity | 9 |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1,2,3,4,5,6,7,8,9 |  | | -66.7 | -57.2 |
|  | |  | |
|  | |  | |
| Propagation Condition | |  | Config 1,2,3,4,5,6,7,8,9 | 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 | | | | | | | |

##### A.7.6X.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

For Configuration 1,2,3

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

21.6s (192\*40ms\*1.5+96\*40ms\*1.5+72\*40ms\*1.5) for UE supporting power class 1, or

13.68s (120\*40ms\*1.5+60\*40ms\*1.5+48\*40ms\*1.5) for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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

For Configuration 1,2,3

TBD for UE supporting power class 1, or

TBD for UE supporting other power class.

For Configuration 4,5,6

230.4s (192\*640ms+96\*640ms+72\*640ms) for UE supporting power class 1, or

145.92s (120\*640ms+60\*640ms+48\*640ms) for UE supporting other power class.

For Configuration 7,8,9

TBD for UE supporting power class 1, or

TBD 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 28, R4-2214997>

### < Start of change 29, R4-2215046>

# A.14 NR standalone tests with one or more NR cells in FR2-2

## A.14.X SA: RRC\_IDLE state mobility

### A.14.X.1 Cell re-selection to NR

#### A.14.X.1.1 Cell reselection to FR2-2 intra-frequency NR case

##### A.14.X.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.14.X.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.14.X.1.1.2-1, A.14.X.1.1.2-2 and A.14.X.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.14.X.1.1.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.14.X.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, 3 | Cell1 |  |
| T2 end condition | Active cell |  | 1, 2, 3 | Cell2 |  |
|  | Neighbour cell |  | 1, 2, 3 | Cell1 |  |
| Final condition | Active cell |  | 1, 2, 3 | Cell1 |  |
|  | Neighbour cell |  | 1, 2, 3 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3 | 1 |  |
| Time offset between cells | |  | 1, 2, 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2, 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | >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, 3 | 386 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 1, 2, 3 | 78 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.14.X.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, 3 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | | SR.3.1 TDD | | |
|  |  | 2 | SR.3.1 TDD | | | SR.3.1 TDD | | |
|  |  | 3 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | | CR.3.1 TDD | | |
|  |  | 2 | CR.3.1 TDD | | | CR.3.1 TDD | | |
|  |  | 3 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
|  |  | 2 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
|  |  | 3 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| SSB configuration |  | 1 | SSB.3 FR2 | | | SSB.7 FR2 | | |
|  |  | 2 | [SSB.x FR2] | | | [SSB.x FR2] | | |
|  |  | 3 | [SSB.x FR2] | | | [SSB.x FR2] | | |
| OCNG Pattern |  | 1, 2, 3 | OP.4 | | | OP.4 | | |
| BWchannel | MHz | 1, 2, 3 | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1, 2, 3 | 66 | | | 66 | | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -138 | | | -138 | | |
|  |  | 2 | -132 | | | -132 | | |
|  |  | 3 | -129 | | | -129 | | |
| Pcompensation | dB | 1, 2, 3 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2, 3 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2, 3 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | | SS-RSRP | | |
| AoA setup |  | 1, 2, 3 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
|  | dB | 1, 2, 3 | 8 | -3 | 1.5 | -infinity | 1.5 | -3 |
|  |  |  |  |  |  |  |  |
| Beam assumptionNote 4 |  | 1, 2, 3 | Rough | | | | | |
| Note2 | dBm/SCS | 1 | -93 | | | | | |
|  |  | 2 | -93 | | | | | |
|  |  | 3 | -90 | | | | | |
| Note2 | dBm/15 kHz | 1 | -102 | | | | | |
|  |  | 2 |  | | | | | |
|  |  | 3 |  | | | | | |
|  | dB | 1, 2, 3 | 8 | -3 | 1.5 | -infinity | 1.5 | -3 |
|  |  |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -85 | -96 | -91.5 | -infinity | -91.5 | -96 |
|  |  | 2 | -85 | -96 | -91.5 | -infinity | -91.5 | -96 |
|  |  | 3 | -82 | -93 | -88.5 | -infinity | -88.5 | -93 |
| Io on SSB symbols | dBm/95.04 MHz | 1 | -55.37 | -63.25 | -60.19 | -64.01 | -60.19 | -63.25 |
| of each cell | dBm/380.16 MHz | 2 | -55.37 | -63.25 | -60.19 | -64.01 | -60.19 | -63.25 |
|  | dBm/380.16 MHz | 3 | -55.38 | -63.26 | -60.20 | -64.02 | -60.20 | -63.26 |
| Treselection | s | 1, 2, 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2, 3 | 50 | | | 50 | | |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

##### A.14.X.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 updateon Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 386 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 updateon cell 1.

The cell re-selection delay to an already detected cell shall be less than 78 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 385.28 s, allow 386 s for the cell re-selection delay to a newly detectable cell and 78.08 s for the cell re-selection delay to an already detected cell in the test case, which we allow 78 s.

#### A.14.X.1.2 Cell reselection to FR2-2 inter-frequency NR case

##### A.14.X.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

##### A.14.X.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.14.X.1.2.2-1, A.14.X.1.2.2-2 and A.14.X.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.14.X.1.2.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.14.X.1.2.2-2: General test parameters for FR2-2 inter frequency NR cell re-selection test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell2 | The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1 |
|  | Neighbour cell |  | 1, 2, 3 | Cell1 |  |
| T1 end condition | Active cell |  | 1, 2, 3 | Cell1 | The UE shall perform reselection to cell 1 during T1 |
|  | Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| T3 end condition | Active cell |  | 1, 2, 3 | Cell2 | The UE shall perform reselection to cell 2 with higher priority during T3 |
|  | Neighbour cell |  | 1, 2, 3 | Cell1 |  |
| RF Channel Number | |  | 1, 2, 3 | 1, 2 |  |
| Time offset between cells | |  | 1, 2, 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | [SSB.x FR2-2] |  |
|  | |  | 2 | [SSB.x FR2-2] |  |
|  | |  | 3 | [SSB.x FR2-2] |  |
| SMTC configuration | |  | 1, 2, 3 | SMTC.1 |  |
| DRX cycle length | | s | 1, 2, 3 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | 78 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3 | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 1, 2, 3 | 138 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.14.X.1.2.2-3: Cell specific test parameters for FR2-2 inter frequency NR cell re-selection test case in AWGN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | | Cell 2 | | |
|  |  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| TDD configuration |  | 1, 2, 3 | TDDConf.3.1 | | | TDDConf.3.1 | | |
| PDSCH RMC configuration |  | 1, 2, 3 | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET parameters |  | 1, 2, 3 | CR.3.1 TDD | | | CR.3.1 TDD | | |
| RMSI CORESET RMC configuration |  | 1, 2, 3 | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| OCNG Pattern |  | 1, 2, 3 | OP.1 defined in A.3.2.1 | | | OP.1 defined in A.3.2.1 | | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3 | SSB | | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | | -140 | | |
|  |  | 2 | -134 | | | -134 | | |
|  |  | 3 | -131 | | | -131 | | |
| Pcompensation | dB | 1, 2, 3 | 0 | | | 0 | | |
| Qhysts | dB | 1, 2, 3 | 0 | | | 0 | | |
| Qoffsets, n | dB | 1, 2, 3 | 0 | | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | | SS-RSRP | | |
| AoA setup |  | 1, 2, 3 | Setup 1 defined in A.3.15.1 | | | Setup 1 defined in A.3.15.1 | | |
| Beam assumptionNote 4 |  | 1, 2, 3 | Rough | | | Rough | | |
|  | dB | 1 | 10.5 | 10.5 | 8 | -10.5 | -infinity | 8.5 |
|  |  | 2 |  |  |  |  |  |  |
|  |  | 3 |  |  |  |  |  |  |
| Note2 | dBm/SCS | 1 | -93 | | | -93 | | |
|  |  | 2 | -93 | | | -93 | | |
|  |  | 3 | -90 | | | -90 | | |
| Note2 | dBm/15 kHz | 1, 2, 3 | -102 | | | -102 | | |
|  |  |  | | |  | | |
|  | dB | 1, 2, 3 | 10.5 | 10.5 | 8 | -10.5 | -infinity | 8.5 |
|  |  |  |  |  |  |  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -83.5 | -83.5 | -85 | -103.5 | -infinity | -84.5 |
|  |  | 2 | -83.5 | -83.5 | -85 | -103.5 | -infinity | -84.5 |
|  |  | 3 | -80.5 | -80.5 | -82.5 | -100.5 | -infinity | -81.5 |
| Io | dBm/95.04 MHz | 1 | -51.97 | -51.97 | -55.46 | -63.64 | -64.01 | -55.46 |
|  | dBm/380.16 MHz | 2, 3 | -51.99 | -51.99 | -55.48 | -63.66 | -64.03 | -55.48 |
| Treselection | s | 1, 2, 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2, 3 | 50 | | | 50 | | |
| Threshx, highP | dB | 1, 2, 3 | 48 | | | 48 | | |
| Threshserving, lowP | dB | 1, 2, 3 | 44 | | | 44 | | |
| Threshx, lowP | dB | 1, 2, 3 | 50 | | | 50 | | |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | 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.14.X.1.2.3 Test Requirements

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

The cell re-selection delay to a higher priority cell shall be less than 138 s.

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

The cell re-selection delay to a lower priority cell shall be less than 78 s.

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

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

Where:

Thigher\_priority\_search See clause 4.2.2.7

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

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

This gives a total of 138.08 s, allow 138 s for the cell re-selection delay to a higher priority cell and 78.08 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 78 s.

#### A.14.X.1.3 Cell reselection to FR2-2 intra-frequency NR case for UE fulfilling low mobility relaxed measurement criterion

##### A.14.X.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with relaxed measurement criterion specified in clause 4.2.2.9.2.

##### A.14.X.1.3.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.14.X.1.3.2-1, A.14.X.1.3.2-2 and A.14.X.1.3.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. During T1 and T2, only criteria *lowMobilityEvalutation* is configured andfulfilled, where (SrxlevRef – Srxlev) < SSearchDeltaP.UE has not registered with network for the tracking area containing cell2.

Table A.14.X.1.3.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.14.X.1.3.2-2: General test parameters for FR2-2 intra-frequency NR cell re-selection test case for UE fulfilling low mobility criterion

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell1 | The UE camps on cell 1 in the initial phase |
|  | Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2, 3 | Cell2 | The UE reselects to cell 2 during T1 period |
|  | Neighbour cells |  | 1, 2, 3 | Cell1 |  |
| Final condition | Active cell |  | 1, 2, 3 | Cell1 | The UE reselects to cell 1 during T2 period |
| Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3 | 1 |  |
| Time offset between cells | |  | 1, 2, 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2, 3 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2, 3 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | 240 |  |
| T2 | | s | 1, 2, 3 | 240 |  |

Table A.14.X.1.3.2-3: Cell specific test parameters for FR2-2 intra-frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| TDD configuration |  | 1, 2, 3 | 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 | | |
|  |  | 3 | 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 | | |
|  |  | 3 | 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 | | |
|  |  | 3 | CCR.3.1 TDD | | CCR.3.1 TDD | | |
| SSB configuration |  | 1 | [SSB.x FR2-2] | | [SSB.x FR2-2] | | |
|  |  | 2 | [SSB.x FR2-2] | | [SSB.x FR2-2] | | |
|  |  | 3 | [SSB.x FR2-2] | | [SSB.x FR2-2] | | |
| OCNG Pattern |  | 1, 2, 3 | OP.4 | | OP.4 | | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | | |
|  |  | 2 | -134 | | -134 | | |
|  |  | 3 | -131 | | -131 | | |
| SSearchDeltaP | dB | 1, 2, 3 | 6 | | 6 | | |
| TSearchDeltaP | s | 1, 2, 3 | 5 | | 5 | | |
| Pcompensation | dB | 1, 2, 3 | 0 | | 0 | | |
| Qhysts | dB | 1, 2, 3 | 0 | | 0 | | |
| Qoffsets, n | dB | 1, 2, 3 | 0 | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | SS-RSRP | | |
| AoA setup |  | 1, 2, 3 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | | |
| Beam assumptionNote 4 |  | 1, 2, 3 | Rough | | Rough | | |
|  | dB | 1, 2, 3 | -3 | 1.5 | 1.5 | -3 | |
|  |  |
| Note2 | dBm/SCS | 1 | -93 | | | | |
|  |  | 2 | -93 | | | | |
|  |  | 3 | -90 | | | | |
| Note2 | dBm/15 kHz | 1, 2, 3 | -102 | | | | |
|  |  |  |  | | | | |
|  | dB | 1, 2, 3 | -3 | 1.5 | 1.5 | -3 | |
|  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -96 | -91.5 | -91.5 | -96 | |
|  |  | 2 | -96 | -91.5 | -91.5 | -96 | |
|  |  | 3 | -93 | -88.5 | -88.5 | -93 | |
| Io on SSB symbols of each cell | dBm/95.04 MHz | 1 | -62.45 | -60.19 | -60.19 | -62.45 | |
| dBm/380.16 MHz | 2 | -62.45 | -60.19 | -60.19 | -62.45 | |
|  | dBm/380.16 MHz | 3 | -62.46 | -60.20 | -60.20 | -62.46 | |
| Treselection | s | 1, 2, 3 | 0 | 0 | 0 | 0 | |
| SintrasearchP | dB | 1, 2, 3 | 50 | | 50 | | |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.14.X.1.3.3 Test Requirements

The cell reselection delay to an already detected cell for UE fulfilling low mobility relaxed criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected cell shall be less than 232 s.

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

NOTE: The cell re-selection delay to an already detectable cell can be expressed as: Tevaluate, NR\_Intra + TSI-NR,

Where:

Tevaluate, NR\_Intra See Table 4.2.2.9.2-1 in clause 4.2.2.9,

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 231.68 s, allow 232 s for the cell re-selection delay to an already detected cell for UE fulfilling low mobility criterion in the test case.

#### A.14.X.1.4 Cell reselection to FR2-2 intra-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

##### A.14.X.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with relaxed measurement criterion specified in clause 4.2.2.9.3.

##### A.14.X.1.4.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.14.X.1.4.2-1, A.14.X.1.4.2-2 and A.14.X.1.4.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. During T1 and T2, only criteria *cellEdgeEvaluation* is configured andfulfilled, where Srxlev> SSearchThresholdP.UE has not registered with network for the tracking area containing cell2.

Table A.14.X.1.4.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.14.X.1.4.2-2: General test parameters for FR2-2 intra-frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell1 | The UE camps on cell 1 in the initial phase |
|  | Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2, 3 | Cell2 | The UE reselects to cell 2 during T1 period |
|  | Neighbour cells |  | 1, 2, 3 | Cell1 |
| Final condition | Active cell |  | 1, 2, 3 | Cell1 |  |
| Neighbour cells |  | 1, 2, 3 | Cell2 |  |
| RF Channel Number | |  | 1, 2, 3 | 1 |  |
| Time offset between cells | |  | 1, 2, 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration | |  | 1, 2, 3 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2, 3 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | 240 |  |
| T2 | | s | 1, 2, 3 | 240 |  |

Table A.14.X.1.4.2-3: Cell specific test parameters for FR2-2 intra-frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | | |
|  |  |  | T1 | T2 | T1 | | T2 |
| TDD configuration |  | 1, 2, 3 | 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 | | |
|  |  | 3 | 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 | | |
|  |  | 3 | 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 | | |
|  |  | 3 | CCR.3.1 TDD | | CCR.3.1 TDD | | |
| SSB configuration |  | 1 | [SSB.x FR2-2] | | [SSB.x FR2-2] | | |
|  |  | 2 | [SSB.x FR2-2] | | [SSB.x FR2-2] | | |
|  |  | 3 | [SSB.x FR2-2] | | [SSB.x FR2-2] | | |
| OCNG Pattern |  | 1, 2, 3 | OP.4 | | OP.4 | | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | DLBWP.0.1 | | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | ULBWP.0.1 | | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | | |
|  |  | 2 | -134 | | -134 | | |
|  |  | 3 | -131 | | -131 | | |
| Pcompensation | dB | 1, 2, 3 | 0 | | 0 | | |
| Qhysts | dB | 1, 2, 3 | 0 | | 0 | | |
| Qoffsets, n | dB | 1, 2, 3 | 0 | | 0 | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | SS-RSRP | | |
| AoA setup |  | 1, 2, 3 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | | |
| Beam assumptionNote 4 |  | 1, 2, 3 | Rough | | Rough | | |
|  | dB | 1, 2, 3 | -3 | 1.5 | 1.5 | -3 | |
|  |  |
| Note2 | dBm/SCS | 1 | -93 | | | | |
|  |  | 2 | -93 | | | | |
|  |  | 3 | -90 | | | | |
| Note2 | dBm/15 kHz | 1, 2, 3 | -102 | | | | |
|  |  |  | | | | |
|  | dB | 1, 2, 3 | -3 | 1.5 | 1.5 | -3 | |
|  |  |
| SS-RSRP Note3 | dBm/SCS | 1 | -96 | -91.5 | -91.5 | -96 | |
|  |  | 2 | -96 | -91.5 | -91.5 | -96 | |
|  |  | 3 | -93 | -88.5 | -88.5 | -93 | |
| Io on SSB symbols of each cell | dBm/95.04 MHz | 1 | -62.25 | -60.19 | -60.19 | -62.25 | |
| dBm/380.16 MHz | 2 | -62.25 | -60.19 | -60.19 | -62.25 | |
|  | dBm/380.16 MHz | 3 | -62.27 | -60.21 | -60.21 | -62.27 | |
| Treselection | s | 1, 2, 3 | 0 | 0 | 0 | 0 | |
| SSearchThresholdP |  | 1, 2, 3 | 35 | 35 | 35 | 35 | |
| SintrasearchP | dB | 1, 2, 3 | 50 | | 50 | | |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.14.X.1.4.3 Test Requirements

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

The cell re-selection delay to an already detected cell shall be less than 232 s.

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

NOTE: The cell re-selection delay to an already detected cell can be expressed as: Tevaluate, NR\_Intra + TSI-NR,

Where:

Tevaluate, NR\_Intra See Table 4.2.2.9.3-1 in clause 4.2.2.9,

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 231.68 s, allow 232 s for the cell re-selection delay to an already detected cell for UE fulfilling not-at-cell edge criterion in the test case.

#### A.14.X.1.5 Cell reselection to FR2-2 inter-frequency NR case for UE fulfilling low mobility relaxed measurement criterion

##### A.14.X.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling low mobility criterion specified in clause 4.2.2.10.2.

##### A.14.X.1.5.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.14.X.1.5.2-1, A.14.X.1.5.2-2 and A.14.X.1.5.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with l*owMobilityEvalutation* criterion [2].

Table A.14.X.1.5.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.14.X.1.5.2-2: General test parameters for FR2-2 inter frequency NR cell re-selection test case for UE fulfilling low mobility criterion

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell2 | The UE camps on cell2 and fulfils low mobility (*lowMobilityEvalutation* [2]) criterion. |
|  | Neighbour cell |  | 1, 2, 3 | Cell1 |
| T1 final condition | Active cell |  | 1, 2, 3 | Cell1 | The UE reselects to low priority cell1 during T1 |
|  | Neighbour cell |  | 1, 2, 3 | Cell2 |
| T2 final condition | Active cell |  | 1, 2, 3 | Cell2 | The UE reselects to high priority cell2 during T2 |
|  | Neighbour cell |  |  | Cell1 |
| RF Channel Number | |  | 1, 2, 3 | 1, 2 |  |
| Time offset between cells | |  | 1, 2, 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | [SSB.x FR2-2] |  |
|  | | 2 | [SSB.x FR2-2] |  |
|  | |  | 3 | [SSB.x  FR2-2] |  |
| SMTC configuration | |  | 1, 2, 3 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2, 3 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | 240 | T1 needs to be long enough to allow cell re-selection to already known cell1 |
| T2 | | s | 1, 2, 3 | 240 | T2 needs to be long enough to allow cell re-selection to already known cell2 |

Table A.14.X.1.5.2-3: Cell specific test parameters for FR2-2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2, 3 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1, 2, 3 | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET parameters |  | 1, 2, 3 | CR.3.1 TDD | | CR.3.1 TDD | |
| RMSI CORESET RMC configuration |  | 1, 2, 3 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| OCNG Pattern |  | 1, 2, 3 | OP.1 defined in A.3.2.1 | | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | |
|  |  | 2 | -137 | | -137 | |
|  |  | 3 |  | |  | |
| Pcompensation | dB | 1, 2, 3 | 0 | | 0 | |
| Qhysts | dB | 1, 2, 3 | 0 | | 0 | |
| Qoffsets, n | dB | 1, 2, 3 | 0 | | 0 | |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | SS-RSRP | |
| AoA setup |  | 1, 2, 3 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | |
| Beam assumptionNote 4 |  | 1, 2, 3 | Rough | | Rough | |
|  | dB | 1, 2, 3 | 10.5 | 8 | -10.5 | -8.5 |
| Note2 | dBm/SCS | 1 | -93 | | -93 | |
| 2 | -93 | | -93 | |
|  |  | 3 | -90 | | -90 | |
| Note2 | dBm/15 kHz | 1, 2, 3 | -102 | | -102 | |
|  | dB | 1, 2, 3 | 10.5 | 8 | -10.5 | 8.5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -82.5 | -85 | -103.5 | -84.5 |
|  |  | 2 | -82.5 | -85 | -103.5 | -84.5 |
|  |  | 3 | -79.5 | -82 | -100.5 | -81.5 |
| Io | dBm/95.04 MHz | 1 | -53.14 | -55.37 | -55.37 | -53.14 |
|  | dBm/380.16 MHz | 2 | -53.14 | -55.37 | -55.37 | -53.14 |
|  | dBm/380.16 MHz | 3 | -53.17 | -55.39 | -55.39 | -53.16 |
| TreselectionNR | s | 1, 2, 3 | 0 | | 0 | |
| SnonintrasearchP | dB | 1, 2, 3 | 50 | | Not sent | |
| SSearchDeltaP | dB | 1, 2, 3 | 6 | | 6 | |
| TSearchDeltaP | s | 1, 2, 3 | 5 | | 5 | |
| Threshx, highP | dB | 1, 2, 3 | 48 | | 48 | |
| Threshserving, lowP | dB | 1, 2, 3 | 44 | | 44 | |
| Threshx, lowP | dB | 1, 2, 3 | 50 | | 50 | |
| Propagation Condition |  | 1, 2, 3 | AWGN | | 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.14.X.1.5.3 Test Requirements

The cell reselection delay to an already detected low priority cell (Cell 1) for UE fulfilling low mobility criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 232 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling low mobility criterion is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 232 s.

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

NOTE 1: The cell re-selection delay to an already detected low priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

NOTE 2: The cell re-selection delay to an already detected higher priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

Where:

Tevaluate, NR\_ inter See Table 4.2.2.10.2-1 in clause 4.2.2.10.2

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 231.68 s, allow 232 s for the cell re-selection delay to an already detected low priority cell for UE fulfilling low mobility criterion in the test case.

This gives a total of 231.68 s, allow 232 s for the cell re-selection delay to an already detected high priority cell for UE fulfilling low mobility criterion in the test case.

#### A.14.X.1.6 Cell reselection to FR2-2 inter-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

##### A.14.X.1.6.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling not-at-cell edge criterion specified in clause 4.2.2.10.3.

##### A.14.X.1.6.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.14.X.1.6.2-1, A.14.X.1.6.2-2 and A.14.X.1.6.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with *cellEdgeEvaluation* criterion [2].

Table A.14.X.1.6.2-1: Supported test configurations

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | | |

Table A.14.X.1.6.2-2: General test parameters for FR2-2 inter frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3 | Cell2 | The UE camps on cell2 and fulfils not-at-cell edge (*cellEdgeEvaluation* [2]) criterion. |
|  | Neighbour cell |  | 1, 2, 3 | Cell1 |  |
| T1 final condition | Active cell |  | 1, 2, 3 | Cell1 | The UE reselects to low priority cell1 during T1 |
| Neighbour cell |  | 1, 2, 3 | Cell2 |  |
| T2 final condition | Active cell |  | 1, 2, 3 | Cell2 | The UE reselects to high priority cell2 during T2 |
| Neighbour cell |  | 1, 2, 3 | Cell1 |
| RF Channel Number | |  | 1, 2, 3 | 1, 2 |  |
| Time offset between cells | |  | 1, 2, 3 | 3 μs | Synchronous cells |
| Access Barring Information | | - | 1, 2, 3 | Not Sent | No additional delays in random access procedure. |
| SSB configuration | |  | 1 | [SSB.x FR2-2] |  |
|  | | 2 | [SSB.x FR2-2] |  |
|  | |  | 3 | [SSB.x FR2-2] |  |
| SMTC configuration | |  | 1, 2, 3 | SMTC pattern 1 |  |
| DRX cycle length | | s | 1, 2, 3 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index | |  | 1, 2, 3 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell | |  | 1, 2, 3 | Not configured |  |
| T1 | | s | 1, 2, 3 | 240 | T1 needs to be long enough to allow cell re-selection to already known cell. |
| T2 | | s | 1, 2, 3 | 240 | T2 needs to be long enough to allow cell re-selection to already known cell. |

Table A.14.X.1.6.2-3: Cell specific test parameters for FR2-2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2, 3 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1, 2, 3 | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET parameters |  | 1, 2, 3 | CR.3.1 TDD | | CR.3.1 TDD | |
| RMSI CORESET RMC configuration |  | 1, 2, 3 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| OCNG Pattern |  | 1, 2, 3 | OP.1 defined in A.3.2.1 | | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3 | DLBWP.0.1 | | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3 | ULBWP.0.1 | | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | |
| Qrxlevmin | dBm/SCS | 1 | -140 | | -140 | |
|  |  | 2 | -134 | | -134 | |
|  |  | 3 | -131 | | -131 | |
| Pcompensation | dB | 1, 2, 3 | 0 | | 0 | |
| Qhysts | dB | 1, 2, 3 | 0 | | 0 | |
| Qoffsets, n | dB | 1, 2, 3 | 0 | | 0 | |
| Cell\_selection\_and\_  reselection\_quality\_measurement |  | 1, 2, 3 | SS-RSRP | | SS-RSRP | |
| AoA setup |  | 1, 2, 3 | Setup 1 defined in A.3.15.1 | | Setup 1 defined in A.3.15.1 | |
| Beam assumptionNote 4 |  | 1, 2, 3 | Rough | | Rough | |
|  | dB | 1, 2, 3 | 10.5 | 8 | -10.5 | 8.5 |
| Note2 | dBm/SCS | 1 | -93 | | -93 | |
| 2 | -93 | | -93 | |
|  |  | 3 | -90 | | -90 | |
| Note2 | dBm/15 kHz | 1, 2, 3 | -102 | | -102 | |
|  | dB | 1, 2, 3 | 10.5 | 8 | -10.5 | 8.5 |
| SS-RSRP Note3 | dBm/SCS | 1 | -82.5 | -85 | -103.5 | -84.5 |
|  |  | 2 | -82.5 | -85 | -103.5 | -84.5 |
|  |  | 3 | -79.5 | -82 | -100.5 | -81.5 |
| Io | dBm/95.04 MHz | 1 | -53.14 | -55.37 | -55.37 | -53.14 |
|  | dBm/380.16 MHz | 2 | -53.14 | -55.37 | -55.37 | -53.14 |
|  | dBm/380.16 MHz | 3 | -53.16 | -55.38 | -55.38 | -53.16 |
| SSearchThresholdP |  | 1, 2, 3 | 35 | 35 | 29 | 29 |
| TreselectionNR | s | 1, 2, 3 | 0 | | 0 | |
| SnonintrasearchP | dB | 1, 2, 3 | 50 | | Not sent | |
| Threshx, highP | dB | 1, 2, 3 | 48 | | 48 | |
| Threshserving, lowP | dB | 1, 2, 3 | 44 | | 44 | |
| Threshx, lowP | dB | 1, 2, 3 | 50 | | 50 | |
| Propagation Condition |  | 1, 2, 3 | AWGN | | 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.14.X.1.6.3 Test Requirements

The cell reselection delay to an already detected low priority cell (Cell 1) for UE fulfilling not-at-cell edge criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 232 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling not-at-cell edge criterion is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 232 s.

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

NOTE 1: The cell re-selection delay to an already detected low priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

NOTE 2: The cell re-selection delay to an already detected higher priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

Where:

Tevaluate, NR\_ inter See Table 4.2.2.10.3-1 in clause 4.2.2.10.3

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

This gives a total of 231.68 s, allow 232 s for the cell re-selection delay to an already detected low priority cell for UE fulfilling not-at-cell edge criterion in the test case.

This gives a total of 231.68 s, allow 232 s for the cell re-selection delay to an already detected high priority cell for UE fulfilling not-at-cell edge criterion in the test case.

### < End of change 29, R4-2215046>

### < Start of change 30, R4-2215047>

# A.14 NR standalone tests with one or more NR cells in FR2-2

## A.14.X Signaling characteristics

### A.14.X.3 SCell Activation and Deactivation Delay

#### A.14.X.3.1 SCell Activation and deactivation for SCell in FR2-2 intra-band in non-DRX

##### A.14.X.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 FR2-2 intra-band.

The supported test configurations are shown in table A.14.X.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.14.X.3.1.1-2, and cell specific test parameters are described in Tables A.14.X.3.1.1-3. OTA related test parameters are shown in table A.14.X.3.1.1-4 below.

Table A.14.X.3.1.1-1: Supported test configurations for FR2-2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.14.X.3.1.1-2: General test parameters for FR2-2 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.14.X.3.1.1-3: Cell specific test parameters for FR2-2 SCell activation case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN |  |  | freq1 | | | freq2 | | |
| Duplex mode | Config 1, 2, 3 |  | TDD | | | | | |
| TDD configuration | Config 1, 2, 3 |  | TDDConf.3.1 | | | | | |
| Downlink initial BWP Configuration | Config 1, 2, 3 |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP Configuration | Config 1, 2, 3 |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.1 | | | | | |
| TRS configuration | Config 1, 2, 3 |  | TRS.2.1 TDD | | | | | |
| TCI state | Config 1, 2, 3 |  | TCI.State.0 | | | | | |
| BWchannel | Config 1, 2, 3 | MHz | 100: NRB,c = 66 | | | | | |
| Data RBs allocated | Config 1, 2, 3 |  | 66 | | 66 | | 66 | |
| PDSCH Reference measurement channel | Config 1, 2, 3 |  | SR.3.1 TDD | | | - | | |
| RMSI CORESET Parameters | Config 1, 2, 3 |  | CR.3.1 TDD | | | - | | |
| Dedicated CORESET Parameters | Config 1, 2, 3 |  | CCR.3.1 TDD | | | - | | |
| OCNG Patterns | Config 1, 2, 3 |  | OP.1 | | | | | |
| SSB Configuration | Config 1, 2, 3 |  | SSB.1 FR2-2 | | | | | |
| SMTC Configuration | Config 1, 2, 3 |  | SMTC.1 | | | | | |
| CSI-RS configuration for CSI reporting | Config 1, 2, 3 |  | CSI-RS.3.1 TDD | | | | | |
| reportConfigType | Config 1, 2, 3 |  | periodic | | | N/A | | |
| reportQuantity | Config 1, 2, 3 |  | cri-RI-PMI-CQI | | | N/A | | |
| CSI reporting periodicity | Config 1, 2, 3 | slot | 40 | | | N/A | | |
| CSI reporting offset | Config 1, 2, 3 | slot | 4 | | | N/A | | |
| EPRE ratio of PSS to SSS | Config 1, 2, 3 | 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 | 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: Void  Note 4: Void  Note 5: Void | | | | | | | | |

Table A.14.X.3.1.1-4: OTA related test parameters for FR2-2 SCell activation case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | |
|  | |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration | Config 1, 2 ,3 |  | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | |
| Assumption for UE beams Note 4 | Config 1, 2 ,3 |  | Rough | | | Rough | | |
| Note1 |  | dBm/15kHzNote3 | -104.7 | | | -104.7 | | |
| Note1 | Config 1 | dBm/SCS | -95.7 | | | -95.7 | | |
|  | Config 2 |  | -95.7 | | | -95.7 | | |
|  | Config 3 |  | -92.7 | | | -92.7 | | |
|  |  | dB | 7 | | | 7 | | |
| SSB\_RPNote2 | Config 1 | dBm/SCS Note4 | -88.7 | | | -88.7 | | |
|  | Config 2 |  | -88.7 | | | -88.7 | | |
|  | Config 3 |  | -85.7 | | | -85.7 | | |
|  |  | dB | 7 | | | 7 | | |
| IoNote2 | Config 1 | dBm/95.04 MHz Note3 | -58.92 | | | -58.92 | | |
|  | Config 2 | dBm/380.16 MHz | -58.92 | | | -58.92 | | |
|  | Config 3 | dBm/380.16 MHz | -58.93 | | | -58.93 | | |
| 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: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  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.14.X.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.14.X.3.2 SCell Activation and deactivation for FR1+FR2-2 inter-band with target SCell in FR2-2

##### A.14.X.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.14.X.3.1.1 except the PCell is in FR1 and SCell is in FR2-2.

The supported test configurations are defined in Table A.14.X.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.14.X.3.2.1-2. OTA related test parameters are defined in Table A.14.X.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.14.X.3.2.1-1: Supported test configurations for FR2-2 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 |
| 4 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target SCell: 480 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 5 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target SCell: 960 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.14.X.3.2.1-2: Cell specific test parameters for FR2-2 SCell activation case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | Cell 1 | | | | Cell 2 | | |
| T1 | T2 |  | |  | T1 | T2 |
| SSB ARFCN | |  | Freq1 | | | | Freq2 | | |
| Duplex mode | Config 1 |  | FDD | | | | TDD | | |
| Config 2,3,4,5 |  | TDD | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | TDDConf.3.1 | | | |
| Config 2 | TDDConf.1.1 | | |
| Config 3,4,5 | TDDConf.2.1 | | |
| Downlink initial BWP Configuration | Config 1,2,3,4,5 |  | DLBWP.0.1 | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3,4,5 |  | DLBWP.1.1 | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3,4,5 |  | ULBWP.0.1 | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3,4,5 |  | ULBWP.1.1 | | | | | | |
| TRS configuration | Config 1,2,3,4,5 |  | N/A | | | | TRS.2.1 TDD | | |
| TCI state | Config 1,2,3,4,5 |  | TCI.State.0 | | | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | 100: NRB,c = 66 | | |
| Config 3,4,5 | 40: NRB,c = 106 | | | |
| Data RBs allocated | Config 1,2 |  | 52 | 66 | 52 | | 66 | 52 | 66 |
| Config 3,4,5 | 106 | 106 | | 106 |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | - | | |
| Config 2 |  | SR.1.1 TDD | | | |
| Config 3,4,5 |  | SR.2.1 TDD | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | - | | |
| Config 2 |  | CR.1.1 TDD | | | |
| Config 3,4,5 |  | CR.2.1 TDD | | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | | - | | |
| Config 2 | CCR.1.1 TDD | | | |
| Config 3,4,5 | CCR.2.1 TDD | | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | [SSB.x FR2-2] | | |
| Config 3 |  | SSB.2 FR1 | | | | [SSB.x FR2-2] | | |
|  | Config 4 |  |  | | | | [SSB.x FR2-2] | | |
|  | Config 5 |  |  | | | | [SSB.x FR2-2] | | |
| CSI-RS configuration for CSI reporting | Config 1,2,3,4,5 |  | N/A | | | | N/A | CSI-RS.3.1 TDD Note 6 | CSI-RS.3.1 TDD |
| reportConfigType for CSI reporting |  |  | periodic | | | | N/A | | |
| reportConfigType for L1-RSRP |  |  | periodic | | | | N/A | | |
| reportQuantity for CSI reporting |  |  | cri-RI-PMI-CQI | | | | N/A | | |
| reportQuantity for L1-RSRP |  |  | ssb-Index-RSRP | | | | N/A | | |
| CSI reporting periodicity | Config 1,2 | slot | 5 | | | | N/A | | |
| Config 3,4,5 | 10 | | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 | slot | 5 | | | | N/A | | |
| Config 3,4,5 | 10 | | | |
| CSI reporting offset | Config 1,2 | slot | 2 | | | | N/A | | |
| Config 3,4,5 | 4 | | | |
| L1-RSRP reporting offset | Config 1,2 | slot | 2 | | | | N/A | | |
| Config 3,4,5 | 4 | | | |
| 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 | |  | 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: Void  Note 5: All parameters apply for configuration 1, 2 and 3  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.14.X.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2-2 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 4 |  | -95.7 | | | | |
|  | Config 5 |  | -92.7 | | | | |
|  | Config 1,2,3,4,5 | dB | -∞ | | 7 | | 7 |
|  | Config 1,2,3,4,5 | dB | -∞ | | 7 | | 7 |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -∞ | | -88.7 | | -88.7 |
|  | Config 4 |  | -∞ | | -88.7 | | -88.7 |
|  | Config 5 |  | -∞ | | -85.7 | | -85.7 |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -66.71 | | -58.92 | | -58.92 |
|  |  | dBm/380.16 MHz |  | | | -66.71 | | -58.92 | | -58.92 |
|  |  | dBm/380.16 MHz |  | | | -66.72 | | -58.93 | | -58.93 |
| 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.14.X.3.2.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after at least one CSI-RS transmission occasion for channel measurement and reporting 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 + 23\*TSMTC\_MAX + 12\*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=240ms and TL1-RSRP, report=5ms, which allows TL1-RSRP [980] ms.

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 + 23\*TSMTC\_MAX + 12\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows [1100] ms

- 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.

#### A.14.X.3.3 SCell Activation and deactivation for SCell in FR2-2 inter-band in non-DRX

##### A.14.X.3.3.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.14.X.3.1.1 except the PCell and SCell are in FR2-2 inter-band.

The supported test configurations are shown in table A.14.X.3.3.1-1 below. The general test parameters are described in Tables A.14.X.3.3.1-2, and cell specific test parameters are described in Tables A.14.X.3.3.1-3. OTA related test parameters are shown in table A.14.X.3.3.1-4 below.

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. Immediately at beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2. 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.14.X.3.3.1-1: Supported test configurations for FR2-2 SCell activation in FR2-2 inter-band

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.14.X.3.3.1-2: General test parameters for FR2-2 SCell activation in FR2-2 inter-band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number |  |  | 1,2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2-2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell | Config 1,2,3 |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell | Config 1,2,3 |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. |
| CP length | Config 1,2,3 |  | Normal |  |
| DRX | Config 1,2,3 |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | Config 1,2,3 |  | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on NR channel number | Config 1,2,3 | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | Config 1,2,3 | ms | 160 |  |
| Cell2 timing offset to cell1 | Config 1,2,3 | μs | ≤8 | A random value from 0μs to 8μs |
| T1 | Config 1,2,3 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | Config 1,2,3 | s | 2 | During this time the UE shall activate the SCell. |
| T3 | Config 1,2,3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | Config 1,2,3 | 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 | Config 1,2,3 | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.14.X.3.3.1-3: Cell specific test parameters for FR2-2 SCell activation in FR2-2 inter-band

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 1,2,3 |  | TDD | | TDD | | TDD | |
| TDD configuration | Config 1,2,3 |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | 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 | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration | Config 1,2,3 |  | TRS.2.1 TDD | | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | |
| BWchannel | Config 1,2,3 | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel | Config 1,2,3 |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters | Config 1,2,3 |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters | Config 1,2,3 |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| CSI-RS configuration | Config 1,2,3 |  | NA | NA | NA | CSI-RS.3.1 TDD Note 2 | NA | CSI-RS.3.1 TDD |
| CSI reporting periodicity Note 3 | Config 1,2,3 |  | NA | 5 | NA | 5 | NA | 5 |
| OCNG Patterns | Config 1,2,3 |  | OP.1 | | | | | |
| SSB Configuration | Config 1,2,3 |  | [SSB.x FR2-2] | | | | | |
| SMTC Configuration | Config 1,2,3 |  | SMTC.1 | | | | | |
| EPRE ratio of PSS to SSS | Config 1,2,3 | 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 | 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: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | |

Table A.14.X.3.3.1-4: OTA related test parameters for FR2-2 SCell activation in FR2-2 inter-band

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup | Config 1,2,3 |  | Setup 3 as specified in clause A.3.15 | | | | | |
| **AoA1** | | | **AoA2** | | |
| Assumption for UE beams Note 7 | Config 1,2,3 |  | Rough | | | Rough | | |
| Note1 | Config 1,2,3 | dBm/15kHzNote4 | -92.1 | | | -92.1 | | |
| Note1 | Config 1 | dBm/SCSNote3 | -83.1 | | | -83.1 | | |
|  | Config 2 |  | -83.1 | | | -83.1 | | |
|  | Config 3 |  | -80.1 | | | -80.1 | | |
|  | Config 1,2,3 | dB | 0 | | | 0 | | |
| SS-RSRPNote2 | Config 1 | dBm/SCS Note4 | -83.1 | | | -83.1 | | |
|  | Config 2 |  | -83.1 | | | -83.1 | | |
|  | Config 3 |  | -80.1 | | | -80.1 | | |
|  | Config 1,2,3 | dB | 0 | | | 0 | | |
| IoNote2 | Config 1 | dBm/95.04 MHz Note4 | -51.10 | | | -51.10 | | |
|  | Config 2 | dBm/380.16 MHz | -51.10 | | | -51.10 | | |
|  | Config 3 | dBm/380.16 MHz | -51.12 | | | -51.12 | | |
| 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 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: All parameters apply for configuration 1  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.14.X.3.3.2 Test Requirements

During T2 the UE shall start sending CSI report for the SCell in the configured slots for CSI reporting after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k). UE shall send the first CSI report for SCell after receiving at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k), or in the next available uplink resource for CSI reporting if the slot was 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 + 23\*TSMTC\_MAX +12\*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, report=5ms, which allows TL1-RSRP =1480ms.

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.14.X.3.3.1-2

- Tactivation\_time = 3ms + TFirstSSB\_MAX + 23\*TSMTC\_MAX + 12\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 1510ms

- TCSI\_Reporting = 10ms

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

During T2, the interruption of PCell during SCell activation shall not happen outside the slot to , where TX =20ms.

During T3, the UE shall stop sending CSI reports for SCell no later than slot , 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.

#### A.14.X.3.4 Direct SCell activation at SCell addition of known SCell in FR2-2

##### A.14.X.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the delay and interruption for direct SCell activation delay at SCell addition are within the requirements stated in clause 8.3.4.

The supported test configurations are shown in Table A.14.X.3.4.1-1 below. The general test parameters are given in Table A.14.X.3.4.1-2 and cell-specific test parameters in Table A.14.X.3.4.1-3. OTA related test parameters are shown in Table A.14.X.3.4.1-4.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two FR2-2 carriers and two NR cells. Before the test starts the UE is connected to Cell 1 (PCell) on carrier #1, but is not aware of Cell 2 on NR carrier #2. Cell 1 and Cell 2 have constant signal levels throughout the test. The UE is monitoring the PCell. 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 Cell 2 is monitored by the UE. During T1, Cell 2 should be detected and measured by the UE such that it meets the condition for known cell defined in clause 8.3.4 for direct SCell activation.

Time period T2 starts when the *RRCReconfiguration* message for the configuration and activation of Cell 2 (the SCell), which is sent from the test equipment, is received at the UE antenna connector in a slot # denoted m. The test equipment shall set the parameter *sCellState* to *activated* for the SCell, which causes Cell 2 to become configured and activated.

Time period T3 starts at (m + Ndirect), at which point UE shall be reporting a valid CQI for both PCell and SCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation of SCell. The test equipment verifies the activation time by counting the slots from the time when the SCell activation message is sent until a CQI report with other than CQI index 0 is received.

Table A.14.X.3.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 480 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| 3 | NR 960 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.14.X.3.4.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number |  |  | 1,2 | Two NR radio channels (1,2) in FR2-2 are used for this test |
| Active PCell | Config 1, 2 ,3 |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured and activated SCell | Config 1, 2 ,3 |  | Cell 2 | Configured and activated SCell on NR RF channel number 2. |
| CP length | Config 1, 2 ,3 |  | Normal |  |
| DRX | Config 1, 2 ,3 |  | OFF | Continuous monitoring of primary cell |
| SCell measurement cycle (measCycleSCell) | Config 1, 2 ,3 | ms | 160 |  |
| T1 | Config 1, 2 ,3 | s | 7 | During this time the measurement for Cell 2 is configured, and Cell 2 is detected. |
| T2 | Config 1, 2 ,3 | s | Ndirect | During this time the UE shall configure and activate Cell 2 as SCell. |
| T3 | Config 1, 2 ,3 | ms | 100 | During this time the UE shall report valid CQI for both PCell and SCell. |
| THARQ | Config 1, 2 ,3 | 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] |
| k | Config 1, 2 ,3 | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

Table A.14.X.3.4.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | Cell 2 | | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN | |  | freq1 | | freq2 | | | |
| Duplex mode | Config 1, 2, 3 |  | TDD | | | | | |
| TDD configuration | Config 1, 2, 3 |  | TDDConf.3.1 | | | | | |
| BWchannel | Config 1, 2, 3 | MHz | 100: NRB,c = 66 | | | | | |
| DL initial BWP configuration | Config 1, 2, 3 |  | DLBWP.0.1 | | | | | |
| DL dedicated BWP configuration | Config 1, 2, 3 |  | DLBWP.1.1 | | | | | |
| UL initial BWP configuration | Config 1, 2, 3 |  | ULBWP.0.1 | | | | | |
| UL dedicated BWP configuration | Config 1, 2, 3 |  | ULBWP.1.1 | | | | | |
| Timing offset to Cell 1 | | ms | Not Applicable | | 0 | | | |
| PDSCH Reference measurement channel | Config 1, 2, 3 |  | SR.3.1 TDD | | SR.3.1 TDD | | | |
| RMSI CORESET Reference Channel | Config 1, 2, 3 |  | CR.3.1 TDD | | CR.3.1 TDD | | | |
| RMC CORESET Reference Channel | Config 1, 2, 3 |  | CCR.3.1 TDD | | CCR.3.1 TDD | | | |
| TRS configuration | Config 1, 2, 3 |  | TRS.2.1 TDD | | TRS.2.1 TDD | | | |
| CSI-RS configuration | Config 1, 2, 3 |  | CSI-RS.3.1 TDD | | CSI-RS.3.1 TDD | | | |
| CSI reporting periodicity | Config 1, 2, 3 | ms | 5 | | 5 | | | |
| OCNG Patterns | |  | OP.1 | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| SSB configuration | Config 1, 2, 3 |  | [SSB.x FR2-2] | | [SSB.x FR2-2] | | | |
| 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 both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | | |

Table A.14.X.3.4.1-4: OTA related test parameters

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | | Unit | | Cell 1 | | | Cell 2 | | |
|  | |  | | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration | Config 1, 2, 3 | |  | Setup 1 according to A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 | Config 1, 2, 3 | |  | Rough | | | Rough | | |
| Note1 | Config 1, 2, 3 | | dBm/15kHzNote4 | -112 | | | -112 | | |
| Note1 | Config 1 | | dBm/SCSNote3 | -102.97 | | | -102.97 | | |
|  | Config 2 | |  | -102.97 | | | -102.97 | | |
|  | Config 3 | |  | -99.97 | | | -99.97 | | |
|  | Config 1, 2, 3 | | dB | 14 | | | 14 | | |
| SS-RSRPNote2 | Config 1 | | dBm/SCS Note4 | -88.97 | | | -88.97 | | |
|  | Config 2 | |  | -88.97 | | | -88.97 | | |
|  | Config 3 | |  | -85.97 | | | -85.97 | | |
|  | Config 1, 2, 3 | | dB | 14 | | | 14 | | |
| IoNote2 | Config 1 | | dBm/95.04 MHz Note4 | -59.81 | | | -59.81 | | |
|  | Config 2 | | dBm/380.16 MHz | -59.81 | | | -59.81 | | |
|  | Config 3 | | dBm/380.16 MHz | -59.83 | | | -59.83 | | |
| 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 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: All parameters apply for configuration 1  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.14.X.3.4.2 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 CSI reports for SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

Ndirect = TRRC\_Process + T1 + Tactivation\_time + TCSI\_Reporting - 3ms,

- TRRC\_Process = 16ms, which is the RRC procedure delay defined for SCell addition in clause 12 of TS 38.331 [2],

- T1 is the delay from slot m + TRRC\_Process until the transmission of *RRCReconfigurationComplete* message,

- Tactivation\_time = TFirstSSB+ 5ms = 25ms,

- TCSI\_Reporting = 10ms

This gives a total of Ndirect = 16 + T1 + 25 + 10 - 3 = (48 + T1) ms, and NR slot length is 0.125ms.

During T3 the UE shall send CSI reports for SCell with non-zero CQI index and continue to send CSI reports for SCell with non-zero CQI index until the end of T3.

During T2 interruption of PSCell during SCell activation shall not happen outside the window from slot *m*+1 to slot *m+*1+ as defined in clause 8.3.4, where TX =20ms.

The interruption of PCell due to activation of SCell shall not be more than the values specified for NR SA in clause 8.2.2.2.11.

All of the above test requirements shall be fulfilled in order for the observed SCell activation 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 8.3.4 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

#### A.14.X.3.5 Direct SCell activation at handover with known SCell in FR2-2

##### A.14.X.3.5.1 Test Purpose and Environment

This test is to verify the requirements specified in sub clause 8.3.5 for the FR2-2 handover with direct SCell activation.

The test scenario comprises of three FR2-2 cells, one source PCell (Cell 1), one target PCell (Cell 2) and one SCell (Cell 3). The test consists of three successive time periods, with time durations of T1, T2, and T3 respectively.

At the start of time duration T1, the UE is in connected mode with PCell (Cell 1). Both Cell 2 and Cell 3 are known to UE and UE is reporting CQI for all Cell 1.

Time period T2 starts when UE receives a handover command that initiate handover of UE to Cell2 and also activates Cell 3. This is done using an *RRCConnectionReconfiguration* message with parameter *sCellState* set to *activated* for the Cell 3. The message is sent from the test equipment to the UE and is received in a slot number n at the UE antenna connector. The UE shall accomplish the handover, addition and activation of the SCell no later than slot (n +).

Time period T3 starts at (n +), at which point UE shall be reporting a valid CSI for both Cell 2 and Cell 3 as given in tables A.14.X.3.5.1-1 and A.14.X.3.5.1-2.

Table A.14.X.3.5.1-1: Supported test configurations for FR2-2 handover with direct SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | SCell: NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  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 |
| 2 | SCell: NR 480 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode  Source cell: NR 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode  Target cell: NR 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 3 | SCell: NR 960 kHz SSB SCS, 400MHz bandwidth, TDD duplex mode  Source cell: NR 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode  Target cell: NR 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.14.X.3.5.1-2: General test parameters for FR2-2 handover with direct SCell activation case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
| RF Channel Number | | Config 1,2,3 |  | 1, 2, 3 | Three NR radio channels are used for this test, Cell 1, Cell2 and Cell 3 use RF channel 1, 2 and 3 respectively. |
| A4-Offset | | Config 1,2,3 | dBm | -120 |  |
| Time offset between cells | | Config 1,2,3 |  | 3 μs | Synchronous cells |
| Initial conditions | Source cell | Config 1,2,3 |  | Cell 1 | Source Cell |
| Target cell |  | Cell 2 | Neighbour cell |
| SCell |  | Cell 3 | SCell is not added and activated |
| Final condition | Source cell | Config 1,2,3 |  | Cell 2 | Cell 2 is Source cell after handover |
| Neighbour cell |  | Cell 1 | Neighbour cell |
| SCell |  | Cell 3 | SCell is added and activated |

Table A.14.X.3.5.1-3: Cell specific test parameters for FR2-2 SCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | T1 | | | T2 | | | T3 | | |
| Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 |
| SSB ARFCN | Config 1,2,3 |  | freq1 | freq2 | freq 3 | freq1 | freq2 | freq 3 | freq1 | freq2 | freq3 |
| Duplex mode | Config 1,2,3 |  | TDD | | | TDD | | | TDD | | |
| TDD configuration | Config 1,2,3 |  | TDDConf.3.1 | | | TDDConf.3.1 | | | TDDConf.3.1 | | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | 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 | | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | ULBWP.1.1 | | | ULBWP.1.1 | | |
| TRS configuration | Config 1,2,3 |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | | TRS.2.1 TDD | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | TCI.State.0 | | | TCI.State.0 | | |
| BWchannel | Config 1,2,3 | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| PDSCH Reference measurement channel | Config 1,2,3 |  | SR.3.1 TDD | | - | SR.3.1 TDD | | - | SR.3.1 TDD | |  |
| RMSI CORESET Parameters | Config 1,2,3 |  | CR.3.1 TDD | | - | CR.3.1 TDD | | - | CR.3.1 TDD | |  |
| Dedicated CORESET Parameters | Config 1,2,3 |  | CCR.3.1 TDD | | - | CCR.3.1 TDD | | - | CCR.3.1 TDD | |  |
| OCNG Patterns | Config 1,2,3 |  | OP.1 | | | | | | | | |
| SSB Configuration | Config 1,2,3 |  | [SSB.xFR2-2] | | | | | | | | |
| SMTC Configuration | Config 1,2,3 |  | SMTC.1 | | | | | | | | |
| PRACH configuration | Config 1,2,3 |  | FR2-2 PRACH configuration 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: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Void | | | | | | | | | | | |

Table A.14.X.3.5.1-4: OTA related test parameters for FR2-2 SCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration | Config 1,2,3 |  | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | | Setup 1 according to table A.3.15.1 | | |
| Assumption for UE beams Note 7 | Config 1,2,3 |  | Rough | | | Rough | | | Rough | | |
| Note1 | Config 1,2,3 | dBm/15kHzNote4 | -112 | | | -112 | | | -112 | | |
| Note1 | Config 1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | | -102.97 | | |
|  | *Config 2* |  | *-102.97* | | | *-102.97* | | | *-102.97* | | |
|  | Config 3 |  | -99.97 | | | -99.97 | | | -99.97 | | |
|  | Config 1,2,3 | dB | 14 | | | 14 | | | 14 | | |
| SS-RSRPNote2 | Config 1 | dBm/SCS Note4 | -88.97 | | | -88.97 | | | -88.97 | | |
|  | Config 2 |  | -88.97 | | | -88.97 | | | -88.97 | | |
|  | Config 3 |  | -85.97 | | | -85.97 | | | -85.97 | | |
|  | Config 1,2,3 | dB | 14 | | | 14 | | | 14 | | |
| IoNote2 | Config 1 | dBm/95.04 MHz Note4 | -59.81 | | | -59.81 | | | -59.81 | | |
|  | Config 2 |  | -59.81 | | | -59.81 | | | -59.81 | | |
|  | Config 3 |  | -59.84 | | | -59.84 | | | -59.84 | | |
| 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 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: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | | | | | |

##### A.14.X.3.5.2 Test Requirements

The UE shall be capable to transmit valid CSI report for PCell (Cell 2) and to the directly activated SCell1 no later than in slot n+ *Ndirect*.

The SCell activation delay, Ndirect, can be expressed as: Ndirect = TRRC\_process + Tinterrupt + T2 + T3 + Tactivation\_time + TCSI\_Reporting - 3ms; Where:

- TRRC\_Process: RRC procedure delay defined in clause 12 of TS 38.331 and it is equal to 16ms,

- Tinterrupt: Interruption time during handover as specified in clause 6.1.1. The value to be verified in the test is 52 ms (Tinterrupt = 0 ms for Tsearch + 10ms for TIU + 20 ms for Tprocessing + 20ms for T∆ + 2 ms for Tmargin ms) by assuming known SCell and SMTC.1 configuration.

- T2: Delay from slot until UE has obtained a valid TA command for the target PCell,

- T3: Delay for applying the received TA for uplink transmission in the target PCell, and greater than or equal to k+1 slot, where k is defined in clause 4.2 in TS 38.213,

- Tactivation\_timeand TCSI\_Reportingare specified in clause 8.3.2, where the following definitions of *TFirstSSB* and *TFirstSSB\_MAX* as defined in section 8.3.5 shall apply:

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

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

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

During time period T3 of the test, 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 time period T2 of the test, 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.

### < End of change 30, R4-2215047>