**3GPP TSG-RAN4 Meeting #100-eR4-2115468**

**Electronic meeting, 16 – 27 Aug., 2021**

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| *CR-Form-v11.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** |  | **rev** |  | **Current version:** | **16.8.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Big CR to TS 38.133: Rel-16 WIs RRM maintenance Part 1 (Rel-16) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MCC, OPPO | | | | | | | | | |
| ***Source to TSG:*** | RAN4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_NR\_DC\_CA\_enh, NR\_eMIMO,  NR\_RRM\_enh,  NR\_HST | | | | |  | | ***Date:*** | | 2021-08-30 |
|  |  | | | |  | | |  | |  |
| ***Category:*** | **F** |  | | | | | | ***Release:*** | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This big CRs merge the multiple endorsed draft CRs in RAN4#100 e-meeting. The reason for change in each endorsed draft CR is copied below.  **LTE\_NR\_DC\_CA\_enh**   * R4-2113266, Draft CR to TS 38.133 on RRC\_IDLE and RRC\_INACTIVE state mobility, OPPO * To correct some typos for mobility requirements in RRC\_IDLE and RRC\_INACTIVE state. * R4-2114168, DraftCR (R16) Clean-up of test cases for Direct SCell activation and SCell dormancy, Ericsson * Test cases for Direct SCell activation and SCell dormancy * R4-2115427, CR on direct SCell activation (R16), Apple * In existing direct SCell actvation at handover requirements, it is assumed that the target SCell being directly activated at handover is just a neighbor cell (not configured as deactivated SCell) before handover. However, it is possible that the SCell being directly activated at handover has already been configured as a deactivated SCell before handover. Side conditions for whether additional time for AGC is needed are different between these two cases. * R4-2115329, Draft CR for Idle Mode measurements of inter-RAT CA candidate cells for early reporting (TC#3), Nokia, Nokia Shanghai Bell * Introduction of test case for Idle Mode measurements of inter-RAT CA candidate cells for early reporting. TC#3 has PCell and serving idle mode cell in NR FR1 while the target carrier is LTE.   **NR\_eMIMO**   * R4-2112534, Correction on the typo in the L1-SINR test case in R16, MediaTek inc. * Two typos in the requirements   **NR\_HST**   * R4-2115327, Draft CR on measurement delay requirements for Rel-16 HST requirements, CMCC * T SSB\_measurement\_period\_intra When highSpeedMeasFlag-r16 is configured, for 160ms < DRX cycle≤ 320ms, there is max(SMTC period, DRX cycle) in the delay requirements. However, the maximum value of SMTC is 160ms, for the case of DRX > 160ms, no need to take the maximum between SMTC period and DRX cycle. * R4-2111965, Draft CR on cell reselection test case for HST in FR1, CATT * In this HST test case, there are multiple mistakes:  1. Test Requirements part is missing 2. Some parameters names and configured values are incorrect 3. T3 is redundant 4. For the test purpose, not clear for HST   **NR\_RRM\_enh**   * R4-2112117, Correction on SMTC alignment for multiple SCell activation R16, Apple, Qualcomm, Huawei, HiSilicon * The condition of SMTC alignment is not correct in the following sentence, “… additional interruptions may be expected for the activated serving cells, where   The number of additional interruptions is no more than the number of FR1 bands which have both SCell being activated for which the activation requirements involves TFirstSSB\_MAX multiple\_scells but not Trs and the active serving cell, and …”   * Some other correction for the equations. * R4-2112532, Correction on the SRS carrier switching in EN-DC and NE-DC in R16, MediaTek inc. * In 8.2.1.2.13 and 8.2.3.2.12, the scenario is the interruption at E-UTRA SRS carrier based switching. Therefore, the SRS transmission is switching from E-UTRA cell to a E-UTRA cell. * R4-2115320, Rel-16 Cat-F CR to FR1 Multiple SCell activation requirement for SSB-less and TCI activation, Qualcomm Incorporated * A TCI activation procedure is not accounted for in the current FR1 unknown multiple SCell activation requirement. * SSB-less SCell activation delay requirement for multiple FR1 SCell is not defined in the current version 38.133 spec * R4-2113635, draftCR on TS38.133 mandatory gaps - r16, Ericsson, Mediatek Inc. * The spec. specifies the applicable rules for measurement gap with *supportedGapPattern-NRonly* in EN-DC or NE-DC UE application table while *supportedGapPattern-NRonly* can only be applied for the UE for NR SA and NR-DC in TS38.306.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | ***supportedGapPattern-NRonly***  Indicates measurement gap pattern(s) optionally supported by the UE for NR SA and NR-DC when the frequencies to be measured within this measurement gap are all NR frequencies. The leading / leftmost bit (bit 0) corresponds to the gap pattern 2, the next bit corresponds to the gap pattern 3 and so on. The UE shall set the bits corresponding to the measurement gap pattern 2, 3 and 11 to 1. | UE | FD | No | No |  * R4-2114211, CR on RRC-based BWP switch on multiple CCs in Rel16, Nokia, Nokia Shanghai Bell * Maintenance CR for RRC-based BWP switch on multiple CCs. resubmission of the agreed R4-2108234 in RAN4#99-e because of the release info error in Rel-17 cat-A CR R4-2111039. * R4-2115428, CR for multiple Scell activation requirements (R16), Apple * In the previous RAN4 meeting, the condition for whether additional time for AGC is needed in FR1 known SCell activation requirement was updated. Specifically, it depends on whether the measurement period is larger than 2400ms or not, rather than whether the SCell measurement cycle is larger than 160ms or not. Correspondingly, requirements for multiple SCell activation need to be updated as well. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The summary of change in each each endorsed draft CR is copied below:  **LTE\_NR\_DC\_CA\_enh**   * R4-2113266, Draft CR to TS 38.133 on RRC\_IDLE and RRC\_INACTIVE state mobility, OPPO   + Add CA measurement in the absence or expiration of T331 in clause 4.4.2.2.   + Other correction on formats and typos. * R4-2114168, DraftCR (R16) Clean-up of test cases for Direct SCell activation and SCell dormancy, Ericsson * A.4.5.3.5 Direct SCell activation at SCell addition of known SCell in FR1   + Corrections:     - THARQ updated with missing multiplication sign (*k1×NR slot length*)     - Removed stray bracket in footer of Table A. 4.5.3.5.1-3   + Removed brackets around values * A.4.5.6.4.1 E-UTRAN – NR FR1 PSCell SCell dormancy switch of single FR1 SCell outside active time   + Corrections:     - Updated and clarified test case applicability. (*A UE which fulfils the requirements in the test case in clause A.4.5.6.4.2 can skip the test case in current clause A.4.5.6.4.1.*)   + Removed brackets around values * A.4.5.6.4.2 E-UTRAN – NR FR1 PSCell SCell dormancy switch of two FR1 SCells inside active time   + Corrections:     - Updated and clarified test case applicability. (*A UE which fulfils the requirements in the test case in current clause A.4.5.6.4.2 can skip the test case in clause A.4.5.6.4.1.*)   + Removed brackets around values * A.5.5.3.7 Direct SCell activation at SCell addition of known SCell in FR2   + Corrections:     - Corrected PSCell CQI reporting configuration to ‘slot5’ (0.625ms) to match the TDD configuration.     - Skipped PCell CQI reporting configuration as it is not critical for the test case.   + Removed brackets around values * A.5.5.6.4.1 E-UTRAN – NR FR2 PSCell SCell dormancy switch of single FR2 SCell inside active time   + Corrections:     - Updated and clarified test case applicability. (*A UE which fulfils the requirements in test case in clause A.5.5.6.4.2 can skip the test case in current clause A.5.5.6.4.1.*) * A.5.5.6.4.2 E-UTRAN – NR FR1 PSCell SCell dormancy switch of two FR2 SCells outside active time   + Corrections:     - Removed stray values in Table A.5.5.6.4.2.1-3 for *Dedicated CORESET Parameters for scheduling PDCCH* and *Dedicated CORESET Parameters for DCI 2\_6*.     - Removes stray values in Table A.5.5.6.4.2.1-4 for *Cell 3,4* and *Cell 5*.   + Removed brackets around values * A.6.5.3.5 Direct SCell activation at handover with known SCell in FR1   + Corrections:     - Corrected T1 and T2 in Table A.6.5.3.5.1-2 (*5*, *Ndirect*)   + Removed brackets around values * A.7.5.6.4.1 NR FR2 PCell SCell dormancy switch of single FR2 SCell inside active time   + Corrections:     - Corrected DRX configuration in Table A.7.5.6.4.1.1-2 (OFF)     - Corrected interruption rate in Test Requirements section (1.5%)   + Removed brackets around value * A.7.5.6.4.2 NR FR1 PCell SCell dormancy switch of two FR2 SCells outside active time   + Removed brackets around value * R4-2115427, CR on direct SCell activation (R16), Apple * Clarify that different condition on whether additional time for AGC is needed shall apply if the SCell being directly activated at handover has already been configured as a deactivated SCell before handover. * R4-2115329, Draft CR for Idle Mode measurements of inter-RAT CA candidate cells for early reporting (TC#3), Nokia, Nokia Shanghai Bell * Introdcution of test case #3 for Idle Mode measurements of inter-RAT CA candidate cells for early reporting. * UE in connected mode with PCell (FR1) and LTE PSCell, UE is configured with early measurement reporting with LTE PSCell carrier, Connection is released, UE is in idle mode, Change Rxlevel of LTE cell, Connection setup within T331, network requests early measurement report. s-NonIntraSearch is configured and target cell is known. * Include absolute measurement accuracy test. * Updated based on input in RAN4#98bis: tables for Idle mode are split and description is clarified.   **NR\_eMIMO**   * R4-2112534, Correction on the typo in the L1-SINR test case in R16, MediaTek * Change Table A. 4.6.X.1.1-1 to Table A.4.6.7.1.1-1 * Change Table A.4.6.X.Y.2-1. to Table A.4.6.7.1.2-1   **NR\_HST**   * R4-2115327, Draft CR on measurement delay requirements for Rel-16 HST requirements, CMCC * T SSB\_measurement\_period\_intra When highSpeedMeasFlag-r16 is configured, for 160ms < DRX cycle≤ 320ms, change ceil(4 x M2 Note 2 x Kp) x max(SMTC period,DRX cycle) x CSSFintra to ceil(4 x M2 Note 2 x Kp) x DRX cycle x CSSFintra * R4-2111965, Draft CR on cell reselection test case for HST in FR1, CATT * Add missing part of Test Requirements * Fix names and configured values of some parameters in tables. * Delete T3 * Clarify the test purpose for HST   **NR\_RRM\_enh**   * R4-2112117, Correction on SMTC alignment for multiple SCell activation R16, Apple, Qualcomm, Huawei, HiSilicon * The “*TFirstSSB\_MAX* *multiple\_scells* but not *Trs*” shall be revised to “*TFirstSSB\_MAX* *multiple\_scells* with *Trs*” since “*TFirstSSB\_MAX* *multiple\_scells* with *Trs*” means those CCs need AGC estimation. * Some other correction for the equations * R4-2112532, Correction on the SRS carrier switching in EN-DC and NE-DC in R16, MediaTek inc. * Add the missing “E-TURA” for the LTE cell * R4-2115320, Rel-16 Cat-F CR to FR1 Multiple SCell activation requirement for SSB-less and TCI activation, Qualcomm Incorporated * Added FR1 unknown multiple SCell activation requirements which require TCI activation procedure. * Added an SSB-less SCell activation delay requirement for FR1 multiple SCell * R4-2113635, draftCR on TS38.133 mandatory gaps - r16, Ericsson, Mediatek * Delete the related applicable wordings. * R4-2114211, CR on RRC-based BWP switch on multiple CCs in Rel16, Nokia, Nokia Shanghai Bell * Update the clarificaton which is agreed in draftCR R4-2105835 in RAN4#98bis-e. * R4-2115428, CR for multiple Scell activation requirements (R16), Apple * Update the condition for whether additional time for AGC is needed in multiple FR1 known SCells activation requirement | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are coppied below.  **LTE\_NR\_DC\_CA\_enh**   * R4-2113266, Draft CR to TS 38.133 on RRC\_IDLE and RRC\_INACTIVE state mobility, OPPO * The mobility requirements in RRC\_IDLE and RRC\_INACTIVE state will be incorrect. * R4-2114168, DraftCR (R16) Clean-up of test cases for Direct SCell activation and SCell dormancy, Ericsson * Test cases for Direct SCell activation and SCell dormancy will be incorrect or incomplete. Performance of feature cannot be guaranteed * R4-2115427, CR on direct SCell activation (R16), Apple * Existing requirement would still be incorrect. * R4-2115329, Draft CR for Idle Mode measurements of inter-RAT CA candidate cells for early reporting (TC#3), Nokia, Nokia Shanghai Bell * Specification is incomplete   **NR\_eMIMO**   * R4-2112534, Correction on the typo in the L1-SINR test case in R16, MediaTek * Incorrect test configuration   **NR\_HST**   * R4-2115327, Draft CR on measurement delay requirements for Rel-16 HST requirements, CMCC * R4-2111965, Draft CR on cell reselection test case for HST in FR1, CATT * The HST test case for cell reselectin to E-UTRAN is incomplete.   **NR\_RRM\_enh**   * R4-2112117, Correction on SMTC alignment for multiple SCell activation R16, Apple, Qualcomm, Huawei, HiSilicon * The condition of SMTC alignment is not correct * R4-2112532, Correction on the SRS carrier switching in EN-DC and NE-DC in R16, MediaTek inc. * Incorrect core requirement * R4-2115320, Rel-16 Cat-F CR to FR1 Multiple SCell activation requirement for SSB-less and TCI activation, Qualcomm Incorporated * Unknown FR1 multiple SCell activation might not be fully supported by RRM spec if TCI activation procedure is required as a part of the SCell activation procedure. * SSB-less FR1 multiple SCell activation might not be supported by RRM spec, and FR1 SCell activation latency might always have to include SSB recpetion time even when it’s not necessary. * R4-2113635, draftCR on TS38.133 mandatory gaps - r16, Ericsson, Mediatek. * The spec. is incorrect. * R4-2114211, CR on RRC-based BWP switch on multiple CCs in Rel16, Nokia, Nokia Shanghai Bell * The requirements for RRC-based BWP switch on multiple CCs are not correct. * R4-2115428, CR for multiple Scell activation requirements (R16), Apple * Requirements for multipe SCell activation would not be aligned with single SCell activation requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | **LTE\_NR\_DC\_CA\_enh**   * R4-2113266, Draft CR to TS 38.133 on RRC\_IDLE and RRC\_INACTIVE state mobility, OPPO * 4.4.1 4.4.2.2 4.2.2.11 5.4.1 5.4.2. * R4-2114168, DraftCR (R16) Clean-up of test cases for Direct SCell activation and SCell dormancy, Ericsson * A.4.5.3.5, A.4.5.6.4.1, A.4.5.6.4.2, A.5.5.3.7, A.5.5.6.4.1, A.5.5.6.4.2, A.6.5.3.5, A.7.5.6.4.1, A.7.5.6.4.2 * R4-2115427, CR on direct SCell activation (R16), Apple * 8.3.5 * R4-2115329, Draft CR for Idle Mode measurements of inter-RAT CA candidate cells for early reporting (TC#3), Nokia, Nokia Shanghai Bell * New section: A.x.x.x   **NR\_eMIMO**   * R4-2112534, Correction on the typo in the L1-SINR test case in R16, MediaTek * A.4.6.7.1   **NR\_HST**   * R4-2115327, Draft CR on measurement delay requirements for Rel-16 HST requirements, CMCC * 9.2.5.2 * R4-2111965, Draft CR on cell reselection test case for HST in FR1, CATT * A.6.1.2.5   **NR\_RRM\_enh**   * R4-2112117, Correction on SMTC alignment for multiple SCell activation R16, Apple, Qualcomm, Huawei, HiSilicon * 8.3.7 * R4-2112532, Correction on the SRS carrier switching in EN-DC and NE-DC in R16, MediaTek inc. * 8.2.1.2.13 and 8.2.3.2.12 * R4-2115320, Rel-16 Cat-F CR to FR1 Multiple SCell activation requirement for SSB-less and TCI activation, Qualcomm Incorporated * 8.3.7 * R4-2113635, draftCR on TS38.133 mandatory gaps - r16, Ericsson, Mediatek Inc. * 9.1.2 * R4-2114211, CR on RRC-based BWP switch on multiple CCs in Rel16, Nokia, Nokia Shanghai Bell * 8.6.3A * R4-2115428, CR for multiple Scell activation requirements (R16), Apple * 8.3.7 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | |  | | | |
| ***Other specs*** | |  | **X** | Other core specifications | | |  | | | |
| ***affected:*** | | **X** |  | Test specifications | | | TS38.533 | | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | |  | | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |

**< Start of change 1>**

Modification 1

4.4.1 Introduction

A UE supporting *idleInactiveNR-MeasReport-r16* or *idleInactiveEUTRA-MeasReport-r16* shall perform the idle mode measurement on the inter-frequency CA and DC candidate frequencies/cells and E-UTRAN inter-RAT DC candidate frequencies/cells indicated by higher layers and meet the requirement specified in this clause. The UE shall perform idle mode measurements provided that the serving cell support early measurement and is within the validity area. The idle mode measurement requirements apply to a configured carrier frequency and the serving cell are among the supported band combination of the UE.

End of Modification 1

Unchanged Sections Omitted

Modification 2

4.4.2.2 Measurements of inter-frequency CA/DC candidate cells

While T331 is running, the UE shall perform measurement on the configured inter-frequency carriers for idle mode CA measurement reporting according to the UE measurement capability.

A UE which supports *idleInactiveNR-MeasReport-r16* shall support idle mode CA/DC measurements of:

- at least 7 inter-frequency carriers which are also configured for inter-frequency mobility measurements, and

- at least 7 inter-frequency carriers which are not configured for inter-frequency mobility measurements.

The UE shall be capable of monitoring a total of at least 7 inter-frequency carriers for idle mode CA/DC measurements comprising of carriers configured for inter-frequency mobility measurements and carriers not configured for inter-frequency mobility measurements.

For inter-frequency carriers configured for idle mode CA/DC measurements, if Srxlev ≤ SnonIntraSearchP and Squal ≤ SnonIntraSearchQ the inter-frequency measurement requirements in clause 4.2.2.4 shall apply, where UE shall search for and measure inter-frequency layers configured for idle mode CA/DC measurements in preparation for possible reporting. If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ the UE shall search for inter-frequency layers configured for idle mode CA/DC measurements at least every Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7, where UE shall search for and measure inter-frequency layers configured for idle mode CA/DC measurements in preparation for possible reporting.

For UE supporting *idleInactiveNR-MeasBeamReport-r16*, if the UE is configured with *beamMeasConfigIdle-r16* for idle mode CA/DC measurement, the UE shall be capable of performing SS-RSRP, SS-RSRQ for at least

- 7 SSBs with different SSB index and/or PCI on an inter-frequency layer in FR1,

- 10 SSBs with different SSB index and/or PCI on an inter-frequency layer in FR2.

For UE supporting *idleInactiveNR-MeasBeamReport-r16*, if the UE is configured with *beamMeasConfigIdle-r16* for idle mode DC measurement, the UE shall be able to acquire the SSB index for a newly detectable inter-frequency NR cell and perform RSRP/RSRQ measurement within the requirements defined in clause 4.2.2.4 plus TSSB\_index,NR, where TSSB\_index,NR is the additional time period used to acquire the index of the SSB being measured as defined in table 4.4.2.2-1.

**Table 4.4.2.2-1: TSSB\_index,NR\_Inter**

|  |  |  |  |
| --- | --- | --- | --- |
| **DRX cycle length [s]** | **Scaling Factor (N1)** | | **TSSB\_index,NR\_Inter [s] (number of DRX cycles)** |
|  | **FR1** | **FR2Note1** |  |
| 0.32 | 1 | 8 | N2 x 1.28 x N1 x 1.5 (N2 x 4 x N1 x 1.5) |
| 0.64 |  | 5 | N2 x 1.28 x N1 (N2 x 2 x N1) |
| 1.28 |  | 4 | N2 x 1.28 x N1 (N2 x 1 x N1) |
| 2.56 |  | 3 | N2 x 2.56 x N1 (N2 x 1 x N1) |
| Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.  NOTE 2: N2 = 3 if the NR inter-frequency carrier for idle mode CA/DC measurement reporting is in FR1, and N2 = 5 if the NR inter-frequency carrier for idle mode CA/DC measurement reporting is in FR2. | | | |

In the absence or expiration of T331, it is up to UE implementation to perform the idle mode CA/DC measurement.

For inter-frequency carriers configured for idle mode CA/DC measurements, the UE shall be capable of performing SS-RSRP and SS-RSRQ measurements of the carriers, and the UE physical layer shall be capable of reporting SS-RSRP and SS-RSRQ measurements of the carriers configured for idle mode CA/DC measurements to higher layers, with measurement accuracy as specified in clauses [10.1.4B, 10.1.5B ] and [10.1.9B, 10.1.10B ], respectively.

The UE shall be able to report idle mode CA/DC measurements when idle mode CA/DC measurement reporting is requested by the network.

4.4.2.3 Measurements on serving cell

The UE shall measure the RSRP and RSRQ level of the serving cell and evaluate the cell selection criterion S defined in clause 4.2.2.2 and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements of the serving cell to higher layers, with measurement accuracy as specified in clause [10.1]

4.4.2.4 Measurements of E-UTRAN inter-RAT DC candidate cells

While T331 is running, the UE shall perform measurement on the configured inter-RAT carriers for idle mode CA/DC measurement reporting according to the UE measurement capability.

A UE which supports *idleInactiveEUTRA-MeasReport-r16* shall support idle mode DC measurements of:

- at least 7 E-UTRAN inter-RAT carriers which are also configured for inter-frequency mobility measurements, and

- at least 1 E-UTRAN inter-RAT carrier which is not configured for inter-frequency mobility measurements.

The UE shall be capable of monitoring a total of at least 7 inter-RAT carriers for idle mode CA/DC measurements comprising of carriers configured for inter-frequency mobility measurements and carriers not configured for inter-frequency mobility measurements.

For inter-RAT carriers configured for idle mode CA/DC measurements, if Srxlev ≤ SnonIntraSearchP and Squal ≤ SnonIntraSearchQ the inter-RAT measurement requirements in clause 4.2.2.5 shall apply, where UE shall search for and measure inter-RAT layers configured for idle mode CA/DC measurements in preparation for possible reporting. If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ the UE shall search for inter-RAT layers configured for idle mode CA/DC measurements at least every Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2, where UE shall search for and measure inter-RAT layers configured for idle mode CA/DC measurements in preparation for possible reporting.

For overlapping inter-RAT carriers configured for idle mode CA/DC measurements, the UE shall be capable of performing RSRP and RSRQ measurements of the carriers, and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements of the carriers configured for idle mode CA/DC measurements to higher layers, with measurement accuracy as specified in clauses [9.1.3B] and [9.1.6B] in TS 36.133, respectively.

The UE shall be able to report idle mode CA measurements when idle mode CA measurement reporting is requested by the network.

End of Modification 2

Unchanged Sections Omitted

Modification 3

4.2.2.11 Measurements of inter-RAT E-UTRAN cells for UE configured with relaxed measurement criterion

4.2.2.11.1 Introduction

This clause contains the requirements for measurements on inter-RAT E-UTRAN cells when the UE is configured with any of following relaxed measurement critera:

- Relaxed measurement criterion for UE with low mobility defined in clause 5.2.4.9.1 in [1],

- Relaxed measurement criterion for UE not-at-cell edge defined in clause 5.2.4.9.2 in [1],

- Both low mobility criterion and not-at-cell edge criterion as defined in clauses 5.2.4.9.1 and 5.2.4.9.2 in [1] respectively.

4.2.2.11.2 Measurements for UE fulfilling low mobility criterion

End of Modification 3

Unchanged Sections Omitted

Modification 4

5.4.1 Introduction

A UE supporting *IdleInactiveMeasurements-r16* or *idleInactiveEUTRA-MeasReport-r16* shall perform the idle mode measurement on the inter-frequency CA and DC candidate frequencies/cells and E-UTRAN inter-RAT DC candidate frequencies/cells indicated by higher layers and meet the requirement specified in this clause. The UE shall perform idle mode measurements provided that the serving cell support early measurement and is within the validity area. The idle mode measurement requirements apply to a configured carrier frequency and the serving cell are among the supported band combination of the UE.

End of Modification 4

Unchanged Sections Omitted

Modification 5

5.4.2 Measurement Requirements

The requirements in clause 4.4.2 shall apply.

5.4.2.1 Detected cell requirement during state transition and Idle mode

The requirements in clause 4.4.2.1 shall apply.

5.4.2.2 Measurements of inter-frequency CA/DC candidate cells

The requirements in clause 4.4.2.2 shall apply.

5.4.2.3 Measurements on serving cell

The requirements in clause 4.4.2.3 shall apply.

5.4.2.4 Measurements on E-UTRAN inter-RAT DC candidate cells

The requirements in clause 4.4.2.4 shall apply.

End of Modification 5

**< End of change 1>**

**< Start of change 2>**

Unchanged Sections Omitted

FIRST Modification

A.4.5.3.5 Direct SCell activation at SCell addition of known SCell in FR1

A.4.5.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the direct SCell activation time is within the requirements stated in clause 8.3.4, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.4.5.3.5.1-1 below. The test parameters are given in Tables A.4.5.3.5.1-2 and cell-specific parameters in A.4.5.3.5.1-3 below. The test consists of two successive time periods, with duration of T1 and T2, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the measurement on Cell 3 is configured. The UE now starts measuring the Cell 3. During T1, Cell 3 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. At the end of T1, the test equipment sends an RRC message for direct SCell activation of the Cell 3.

The point in time at which the RRC message for direct SCell actvation is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot , as defined in clause 8.3.4. The UE shall start reporting CSI in PSCell in slot (m+k+TRRC\_process) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot to slot , as defined in clause 8.3.4, where is the interruption length given in clause 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe to subframe , where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and is the interruption length given in TS 36.133 [14] clause 7.32.

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

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

**Table A.4.5.3.5.1-1: known FR1 direct SCell activation supported test configurations**

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

**Table A.4.5.3.5.1-2: General test parameters for known FR1 direct SCell activation**

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

**Table A. 4.5.3.5.1-3: Cell specific test parameters for known FR1 direct SCell activation**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 2** | | | **Cell 3** | | |
|  | | |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| **SSB ARFCN** | | |  | **freq1** | | | **freq2** | | |
| Duplex mode | Config 1,4 | |  | FDD | | | | | |
|  | Config 2,3,5,6 | |  | TDD | | | | | |
| TDD configuration | Config 1,4 | |  | Not Applicable | | | | | |
|  | Config 2,5 | |  | TDDConf.1.1 | | | | | |
|  | Config 3,6 | |  | TDDConf.2.1 | | | | | |
| BWchannel | Config 1,4 | | MHz | 10: NRB,c = 52 | | | | | |
|  | Config 2,5 | |  | 10: NRB,c = 52 | | | | | |
|  | Config 3,6 | |  | 40: NRB,c = 106 | | | | | |
| DL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | DLBWP.0.1 | | | | | |
| DL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | DLBWP.1.1 | | | | | |
| UL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | ULBWP.0.1 | | | | | |
| UL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | ULBWP.1.1 | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | |
| PDSCH Reference | Config 1,4 | |  | SR.1.1 FDD | | | SR.1.1 FDD | | |
| measurement channel | Config 2,5 | |  | SR.1.1 TDD | | | SR.1.1 TDD | | |
|  | Config 3,6 | |  | SR.2.1 TDD | | | SR.2.1 TDD | | |
| RMSI CORESET | Config 1,4 | |  | CR.1.1 FDD | | | CR.1.1 FDD | | |
| Reference Channel | Config 2,5 | |  | CR.1.1 TDD | | | CR.1.1 TDD | | |
|  | Config 3,6 | |  | CR.2.1 TDD | | | CR.2.1 TDD | | |
| RMC CORESET | Config 1,4 | |  | CCR.1.1 FDD | | | CCR.1.1 FDD | | |
| Reference Channel | Config 2,5 | |  | CCR.1.1 TDD | | | CCR.1.1 TDD | | |
|  | Config 3,6 | |  | CCR.2.1 TDD | | | CCR.2.1 TDD | | |
| TRS configuration | Config 1,4 | |  | TRS.1.1 FDD | | | TRS.1.1 FDD | | |
|  | Config 2,5 | |  | TRS.1.1 TDD | | | TRS.1.1 TDD | | |
|  | Config 3,6 | |  | TRS.1.2 TDD | | | TRS.1.2 TDD | | |
| OCNG Patterns | | |  | OP.1 | | | | | |
| SMTC configuration | | |  | SMTC.1 | | | | | |
| SSB configuration | Config 1,2,4,5 | |  | SSB.1 FR1 | | | | | |
|  | Config 3,6 | |  | SSB.2 FR1 | | | | | |
| PDSCH/PDCCH | Config 1,2,4,5 | | kHz | 15 kHz | | | | | |
| subcarrier spacing | Config 3,6 | |  | 30kHz | | | | | |
| EPRE ratio of PSS to SSS | | |  |  | | | | | |
| EPRE ratio of PBCH DMRS to SSS | | |  |  | | | | | |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  | | | | | |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  | | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 | | | | | |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  | | | | | |
| EPRE ratio of PDSCH to PDSCH | | |  |  | | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  | | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  | | | | | |
| Note2 | | | dBm/15kHz | -104 | | | | | |
| Note2 | | Config 1,2,4,5 | dBm/SCS | -104 | | | | | |
|  | | Config 3,6 |  | -101 | | | | | |
|  | | | dB | 17 | | | | | |
|  | | | dB | 17 | | | | | |
| SS-RSRPNote3 | | Config 1,2,4,5 | dBm/SCS | -87 | | | | | |
|  | | Config 3,6 |  | -84 | | | | | |
| SCH\_RP Note 3 | | | dBm/15 kHz | -87 | | | | | |
| Propagation condition | | | - | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. | | | | | | | | | |

A.4.5.3.5.2 Test Requirements

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

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot . Ndirect = TRRC\_Process + T1 + Tactivation\_time + TCSI\_Reporting - 3ms, where TRRC\_Process = 16ms and other components are defined in clause 8.3.4.

During T2 interruption of PSCell during direct SCell activation shall not happen outside the slot to , and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe to subframe, as defined in clause 8.3.4.

The interruption of PSCell shall not be more than the values specified for EN-DC in Clause 8.2.1.2.8.

All of the above test requirements shall be fulfilled in order for the observed direct SCell activation delay to be counted as correct. The rate of correct observed direct SCell activation 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.

End of FIRST Modification

Unchanged Sections Omitted

Second Modification

A.4.5.6.4 SCell dormancy switch

A.4.5.6.4.1 E-UTRAN – NR FR1 PSCell SCell dormancy switch of single FR1 SCell outside active time

A.4.5.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL dormant BWP switch delay requirement defined in clause 8.6, and interruption requirements for NR victim cell defined in clause 8.2.1.2.15 and interruption requirement for E-UTRA victim cell defined in clause 7.32 of TS 36.133 [15]. Supported test configurations are shown in Table A.4.5.6.4.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one NR PSCell (Cell 2) and one NR SCell (Cell 3) as given in Table A.4.5.6.4.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCell are specified in Table A.4.5.6.4.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) and PSCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 3) to ensure that the UE would have ACK/NACK sending except for the time duration when the SCell is in dormancy during T2.

The UE is configured to monitor PDCCH for DCI format 2\_6 at *ps-Offset* before the start of *onDuration*. Two tests are specified, where a UE that only supports triggering within the first three OFDM symbols of a slot shall undergo Test1 only, and a UE that supports triggering also in remaining OFDM symbols of a slot shall undergo both Test1 and Test2. In the tested scenario, *ps-Offset* is selected to correspond to the dormancy switching time specified in clause 8.6.2A.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).

- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-1 in Cell 3 before starting the test.

- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 3 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB. BWP-1 is configured in *OutsideActiveTimeConfig* as *firstOutsideActiveTimeBWP*. BWP-2 is configured as *dormantBWP*.

- UE is configured with RRM measurement on SCC.

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

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

- UE is configured to monitor DCI format 2\_6, and to be active during onDuration even when no DCI format 2\_6 is detected (ps-WakeUp).

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.

Time period T1 starts when a DCI format 2\_6 command for SCell switch from non-dormany to dormancy, sent from the test equipment to the UE, is received at the UE side at *ps-Offset* before *onDuration*. The UE shall switch its SCell bandwidth part from BWP-1 to BWP-2 into dormancy. During T1, test equipement verifies that:

The UE shall be able to receive CSI-RS on SCell BWP-2 at the beginning of the DL slot right after SCell’s DL slot (*i+TdormantBWPswitchDelay*) as defined in clause 8.6. TE shall observe the periodic reporting of CQI for SCell starting from slot (*i+TdormantBWPswitchDelay*).

PCell (Cell 1) interruption due to dormancy switch on SCell shall occur within the dormancy switch delay.

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

Time period T2 starts when T1 is completed. During T2, the test equipment continues to schedule the UE continuously in PCell and PSCell. The UE shall carry out CSI and RRM measurements on the dormant SCells. The UE shall report ACK/NACK in PCell and PSCell in response to scheduled PDSCH, with the maximum loss of transmitted ACK/NACKs fulfilling the requirement in clause 8.2.1.2.15. The test equipment verifies that the loss of ACK/NACKs is no larger than 1.5%.

Time period T3 starts when T2 is completed. During T3, the test equipment does not schedule the UE, by which the inactivity timer expires and the UE stops monitoring PDCCH except for signalling using DCI format 2\_6 at wake-up signalling occasions.

Time period T4 starts when the UE at *ps-Offset* before *onDuration* detects a DCI format 2\_6 carrying dormancy indication that indicates that SCell1 and SCell2 are to be switched from dormancy to non-dormancy. During T4, the test equipment schedules the UE with new data indication in PCell, PSCell and SCell during *onDuration.* The test equipment verifies that:

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

PCell (Cell 1) interruption due to dormancy switch on SCell shall occur within the dormancy switch delay.

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

**Table A.4.5.6.4.1.1-1: DL BWP switch supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: A UE which fulfils the requirements in the test case in clause A.4.5.6.4.2 can skip the test cases in current clause A.4.5.6.4.1.  Note 3: NR configuration is the same for PSCell and SCells. | |

**Table A.4.5.6.4.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | **Comment** |
| **Test1** | **Test2** |
| E-UTRA RF Channel Number |  | 1 | | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2, 3 | | Two NR radio channel is used for this test |
| Active PCell |  | Cell 1 | | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | | PSCell on RF channel number 2. |
| Active SCell |  | Cell 3 | | SCell on RF channel number 3. |
| CP length |  | Normal | |  |
| CSI reporting periodicity, Non-dormant BWP | ms | 2 | | CSI reporting periodicity for periodic reporting of CQI for PCell and non-dormant SCells |
| CSI reporting periodicity, Dormant BWP | ms | 40 | | CSI reporting periodicity for periodic reporting of CQI for dormant SCells |
| ps-Offset |  | Depending on UE capability | | Monitoring of DCI 2\_6 ahead of start of drx-onDurationTimer. Value of ps-Offset shall correspond to SCell dormancy switching time for switching of two SCells, as specified in clause 8.6.2A. Actual value depends on reported UE capabilities. |
| ps-WakeUp |  | true | | Wake up for onDuration in case DCI format 2\_6 is not detected. |
| DRX |  | DRX.1 | |  |
| *'bwp-InactivityTimer* | ms | 200 | |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | | Individual offset for cells on PSCC. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | | Individual offset for cells on SCC. |
| Cell2 timing offset to cell1 | μs | 3 | | Synchronous EN-DC |
| Cell3 timing offset to cell2 | μs | 3 | | Synchronous cells |
| Number of CSI-RS ports |  | 4 | | The number of CSI-RS ports in a single resource without CRI report |
| OFDM symbol range in slot for transmission of DCI with dormancy indication |  | 0 – 2 | 3 – 11 | Test1 is based on that triggering DCI is received within the first three OFDM symbols of a slot. Test2 is based on that the triggering DCI is received later than within the first three OFDM symbols of a slot. |
| T1 | s | 0.2 | |  |
| T2 | s | 10 | |  |
| T3 | s | 0.2 | |  |
| T4 | s | 0.2 | |  |

**Table A.4.5.6.4.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | **Cell 3** |
| Frequency Range | |  | FR1 | |
| Duplex mode | Config 1,4 |  | FDD | |
|  | Config 2,3,5,6 |  | TDD | |
| TDD configuration | Config 1,4 |  | Not Applicable | |
|  | Config 2,5 |  | TDDConf.1.1 | |
|  | Config 3,6 |  | TDDConf.1.2 | |
| BWchannel | Config 1,4 |  | 10 MHz: NRB,c = 52 | |
|  | Config 2,5 |  | 10 MHz: NRB,c = 52 | |
|  | Config 3,6 |  | 40 MHz: NRB,c = 106 | |
| Active BWP ID | |  | 1, 2 | 0 |
| Initial BWP | Config 1,4 |  | DLBWP.0.2 | DLBWP.0.2 |
| Configuration | Config 2,5 |  |  |  |
|  | Config 3,6 |  |  |  |
| Active BWP-0 | Config 1,4 |  | NA | DLBWP.0.2 |
| Configuration | Config 2,5 |  |  |  |
|  | Config 3,6 |  |  |  |
| Active BWP-1 | Config 1,4 |  | DLBWP.1.3 | NA |
| Configuration | Config 2,5 |  |  |  |
|  | Config 3,6 |  |  |  |
| Active BWP-2 | Config 1,4 |  | DLBWP.1.1 | NA |
| Configuration | Config 2,5 |  |  |  |
|  | Config 3,6 |  |  |  |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD | |
| measurement channel | Config 2,5 |  | SR.1.1 TDD | |
|  | Config 3,6 |  | SR2.1 TDD | |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD | |
| parameters | Config 2,5 |  | CR.1.1 TDD | |
|  | Config 3,6 |  | CR2.1 TDD | |
| Dedicated CORESET | Config 1,4 |  | CCR.1.1 FDD | |
| parameters, Test 1 | Config 2,5 |  | CCR.1.1 TDD | |
|  | Config 3,6 |  | CCR.2.1 TDD | |
| Dedicated CORESET | Config 1,4 |  | CCR.1.5 FDD | |
| parameters, Test 2 | Config 2,5 |  | CCR.1.5 TDD | |
|  | Config 3,6 |  | CCR.2.3 TDD | |
| OCNG Patterns | |  | OP.1 | |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 | |
|  | Config 3,6 |  | SSB.2 FR1 | |
| SMTC Configuration | |  | SMTC.1 | |
| TRS Configuration | Config 1,4 |  | TRS.1.1 FDD | |
|  | Config 2,5 |  | TRS.1.1 TDD | |
|  | Config 3,6 |  | TRS.1.2 TDD | |
| Antenna Configuration | |  | 1x2 | |
| Propagation Condition | |  | AWGN | |
| EPRE ratio of PSS to SSS | |  |  |  |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 | 0 |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |  |
| EPRE ratio of OCNG DMRS to SSS Note 1 | |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  |  |
| NocNote 2 | | dBm/15 kHz | -104 | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | -87 |
| Ês/Iot | | dB | 17 | 17 |
| Ês/Noc | | dB | 17 | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | -59 | -59 |
|  | Config 3,6 | dBm/38.16MHz | -61.9 | -61.9 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | |

A.4.5.6.4.1.2 Test Requirements

During T1, any interruption on PCell and PSCell due to dormancy switching of SCell shall be within the requirement specified in in clause 8.2.1.2.15.1 for NR victim cell, and clause 7.32.2.14.1 of 36.133 [15] for E-UTRA victim cell. Starting from *onDuration* in time period T1, the UE shall transmit ACK/NACK in response to scheduling in PCell and PSCell. There shall be no loss of ACK/NACK.

During time period T2, the UE shall transmit ACK/NACKs in response to scheduling in PCell and the rate of missed ACK/NACKs shall be no more than 1.5%.

During T1, any interruption on PCell and PSCell due to dormancy switching of SCell shall be within the requirement specified in in clause 8.2.1.2.15.1 for NR victim cell, and clause 7.32.2.14.1 of 36.133 [15] for E-UTRA victim cell. Starting from *onDuration* in time period T4, the UE shall transmit ACK/NACK in response to scheduling in PCell, SCell1 and SCell2. There shall be no loss of ACK/NACK.

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

A.4.5.6.4.2 E-UTRAN – NR FR1 PSCell SCell dormancy switch of two FR1 SCells inside active time

A.4.5.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify the delay requirement of BWP switching from dormancy to non-dormancy and from non-dormancy to dormancy on SCell defined in clause 8.6.2, and interruption requirements for NR victim cell defined in clause 8.2.1.2.15 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [15]. Supported test configurations are shown in Table A.4.5.6.4.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one NR PSCell (Cell 2) and two NR SCells (Cell 3, and Cell 4) as given in Table A.4.5.6.4.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCells are specified in Table A.4.5.6.4.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) and PSCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 3, and Cell 4) to ensure that the UE would have ACK/NACK sending except for the time duration when SCell (Cell2) performs the dormancy switching and stays in the dormant BWP.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC),, Cell 3 (SCell) on radio channel 3 (SCC) and Cell 4 (SCell) on radio channel 4 (SCC).

- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0, in Cell 2 before starting the test. BWP-0 always include bandwidth of the initial DL BWP and SSB.

- UE is configured with 2 UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2 in Cell 3 and Cell 4 before starting the test.

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

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

- UE is indicated in *dormantBWP -Id* that the dormant BWPis BWP-2 in all SCells.

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 enterning dormant BWP in SCell, sent from the test equipment to the UE, is received at the UE side in PCell’s slot # denoted *i*. Upon reception of the PDCCH indicating entering dormant BWP in PCell, UE shall switch the DL BWP-1 to DL BWP-2 in all SCells, i.e., switching from non-dormant BWP to dormant BWP.

The UE shall be able to receive PDSCH and report valid ACK/NACK on the PCell and PSCell all the time except interruption.

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

The starting time of PSCell (Cell 2) interruption due to dormancy switching on SCells shall occur within the dormant BWP switch delay.

During T2, the test equipment won’t transmit DCI format for PDSCH reception on all SCells.

The UE shall be able to receive PDSCH and report valid ACK/NACK on the PCell and PSCell all the time except interruption.

During T3,

Time period T3 starts when a DCI format 1\_1 command for leaving dormant BWP in SCells, sent from the test equipment to the UE, is received at the UE side in PSCell’s slot # denoted *j*. Upon reception of the PDCCH indicating leaving dormant BWP in PSCell, UE shall switch the DL BWP-2 to DL BWP-1 in SCells, i.e., switching from dormant BWP to non-dormant BWP.

The UE shall be able to receive PDSCH on all SCells no later than the first DL slot that occurs after the beginning of PSCell’s DL slot (*j+* TmutipledormantBWPswitchDelay) as defined in clause 8.6 and starts to report valid ACK/NACK on all SCells no later than the first UL slot that occurs after the beginning of slot (*j+N*) as defined in clause 10.3 in TS38.213.

The UE shall be able to receive PDSCH and report valid ACK/NACK on the PCell and PSCell all the time except interruption.

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

The starting time of PSCell (Cell 2) interruption due to dormancy switching on SCells shall occur within the dormant BWP switch delay.

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

**Table A.4.5.6.4.2.1-1: Dormant BWP switch supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: A UE which fulfils the requirements in the test case in current clause A.4.5.6.4.2 can skip the test cases in clause A.4.5.6.4.1  Note 3: NR configuration is the same for PSCell and SCells. | |

**Table A.4.5.6.4.2.1-2: General test parameters for Dormant BWP switch in synchronous EN-DC**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | **Comment** |
|  |  | **Test 1** | **Test 2** |  |
| E-UTRA RF Channel Number |  | 1 | | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2, 3, 4 | | Three NR radio channels are used for this test |
| Active PCell |  | Cell 1 | | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | | PSCell on RF channel number 2. |
| Active SCell |  | Cell 3 | | SCell on RF channel number 3. |
| Active SCell |  | Cell 4 | | SCell on RF channel number 4. |
| CP length |  | Normal | |  |
| DRX |  | OFF | |  |
| *bwp-InactivityTimer* | ms | 200 | |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | | Individual offset for cells on PSCC. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | | Individual offset for cells on SCC. |
| Cell2 timing offset to cell1 | μs | 3 | | Synchronous EN-DC |
| Cell3 timing offset to cell2 | μs | 3 | | Synchronous cells |
| Cell4 timing offset to cell2 | μs | 3 | | Synchronous cells |
| OFDM symbol range in slot for transmission of DCI with dormancy indication |  | 0 – 2 | 3 – 11 |  |
| T1 | s | 0.2 | |  |
| T2 | s | 0.2 | |  |
| T3 | s | 0.2 | |  |

**Table A.4.5.6.4.2.1-3: NR Cell specific test parameters for Dormant BWP switch in synchronous EN-DC**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | **Cell 3** | **Cell 4** |
| Frequency Range | |  | FR1 | | |
| Duplex mode | Config 1,4 |  | FDD | | |
|  | Config 2,3,5,6 |  | TDD | | |
| TDD configuration | Config 1,4 |  | Not Applicable | | |
|  | Config 2,5 |  | TDDConf.1.1 | | |
|  | Config 3,6 |  | TDDConf.1.2 | | |
| BWchannel | Config 1,4 |  | 10 MHz: NRB,c = 52 | | |
|  | Config 2,5 |  | 10 MHz: NRB,c = 52 | | |
|  | Config 3,6 |  | 40 MHz: NRB,c = 106 | | |
| Active BWP ID | |  | 0 | 1, 2 | |
| Initial BWP | Config 1,4 |  | DLBWP.0.2 | NA | |
| Configuration | Config 2,5 |  |  |  | |
|  | Config 3,6 |  |  |  | |
| Active BWP-0 | Config 1,4 |  | DLBWP.0.2 | NA | |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active BWP-1 | Config 1,4 |  | NA | DLBWP.1.1 | |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| Active BWP-2 | Config 1,4 |  | NA | DLBWP.1.3 | |
| Configuration | Config 2,5 |  |  |
|  | Config 3,6 |  |  |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD | | |
| measurement channel | Config 2,5 |  | SR.1.1 TDD | | |
|  | Config 3,6 |  | SR2.1 TDD | | |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD | | |
| parameters | Config 2,5 |  | CR.1.1 TDD | | |
|  | Config 3,6 |  | CR2.1 TDD | | |
| Dedicated CORESET | Config 1,4 |  | CCR.1.1 FDD | | |
| parameters, Test 1 | Config 2,5 |  | CCR.1.1 TDD | | |
|  | Config 3,6 |  | CCR.2.1 TDD | | |
| Dedicated CORESET | Config 1,4 |  | CCR.1.5 FDD | | |
| parameters, Test 2 | Config 2,5 |  | CCR.1.5 TDD | | |
|  | Config 3,6 |  | CCR.2.3 TDD | | |
| OCNG Patterns | |  | OP.1 | | |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | |
|  | Config 3,6 |  | SSB.2 FR1 | | |
| SMTC Configuration | |  | SMTC.1 | | |
| TRS Configuration | Config 1,4 |  | TRS.1.1 FDD | | |
|  | Config 2,5 |  | TRS.1.1 TDD | | |
|  | Config 3,6 |  | TRS.1.2 TDD | | |
| Antenna Configuration | |  | 1x2 | | |
| Propagation Condition | |  | AWGN | | |
| EPRE ratio of PSS to SSS | |  |  | 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 | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |
| EPRE ratio of OCNG DMRS to SSS Note 1 | |  |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |  |
| NocNote 2 | | dBm/15 kHz | -104 | -104 | |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 | -87 | |
| Ês/Iot | | dB | 17 | 17 | |
| Ês/Noc | | dB | 17 | 17 | |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | -59 | -59 | |
|  | Config 3,6 | dBm/38.16MHz | -61.9 | -61.9 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | | |

A.4.5.6.4.2.2 Test Requirements

During T1, the UE shall be able to to send the ACK/NACK for all SCells before UE PDCCH indicating entering dormant BWP is received in PSCell’s slot # denoted.

During T3, the UE shall start to send the ACK/NACK for all SCells from the first UL slot that occurs after the beginning of DL slot (*j+N*).

Where, *N* is the timing that UE provide HARQ-ACK information in response to a detection of a DCI format 1\_1 indicating SCell dormancy as specified in [3].

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

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

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

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

During T1, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

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

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 7.32.2.7 of TS 36.133 [15].

The interruption of PSCell shall not be longer than the interruption duration specified for dormant BWP switch in clause 8.6.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first DL slot that occurs after the beginning of DL slot (*i+ N*), (*j+ N*), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

End of SECOND Modification

Unchanged Sections Omitted

THIRD Modification

A.5.5.3.7 Direct SCell activation at SCell addition of known SCell in FR2

A.5.5.3.7.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.5 except the SCell is in FR2 intra-band.

The supported test configurations are shown in table A.5.5.3.7.1-1 below. The general and cell specific test parameters are the same except those described in the following clause. The listed parameter values in Tables A.5.5.3.7.1-2 and A.5.5.3.7.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.5.1-2 and A.4.5.3.5.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.7.1-4 below.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. Cell 1 operates in either FDD or TDD duplex mode according to test configuration. Cell 2 and Cell 3 operate in TDD duplex mode. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 2 (PSCell) on radio channel 2 (PSCC), but is not aware of Cell 3 (SCell1) on radio channel 3 (SCC). The UE is only monitoring the PCC/PSCC. The UE shall be continuously scheduled in the PCell/PSCell throughout the whole test.

At the beginning of T1, the UE is configured to measure radio channel 3 and starts detecting the Cell 3 (SCell) on radio channel 3 (SCC). During T1 Cell 3 is detected and measured and measurement report is sent by the UE to the test equipment.

Time period T2 starts when test equipment sends the RRCConnectionReconfiguration message for the activation of the SCell within time period specified in clause 8.3.2 for known cell definition to ensure the configured SCell is known.The NR shall be use an *RRCConnectionReconfigurationComplete* message with parameter *sCellState* set to *activated*for the SCell (Cell 3), which causes the SCell to become configured and activated on radio channel 3 (SCC). The message is sent from the test equipment to the UE and is received in a subframe # denoted m at the UE antenna connector. The UE shall accomplish the activation of the SCell no later than subframe (m+ *Ndirect*).

Time period T3 starts at (m+ *Ndirect*), at which point UE shall be reporting a valid CQI for PCell/PSCell and SCell.

During T3, the UE shall be continuously scheduled in the SCell.

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

The test equipment verifies the CSI report from the direct activated SCell after the activation procedure is completed contains CQI index other than 0.

**Table A.5.5.3.7.1-1: Supported test configurations for FR2 SCell activation case with FR2 PSCell**

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

**Table A.5.5.3.7.1-2: General test parameters for FR2 SCell activation case with FR2 PSCell**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1, 2, 3 | Two radio channels are used for this test. One for E-UTRA cell and two for NR Cell |
| Active PCell |  | Cell1 | PCell on RF channel number 1. As specified in clause A.3.7.2.2 |
| Active PSCell |  | Cell2 | PSCell on RF channel number 2. |
| Deconfigured deactivated SCell |  | Cell3 | Deconfigured deactivated secondary cell on RF channel number 3 |
| DRX |  | OFF | Continuous monitoring of PCell/PSCell |
| PRACH configuration on cell2 |  | FR2 configuration 2 | Captured in A.3.8.3.2 |
| PSCell CQI/PMI periodicity and offset configuration index |  | slot5 | CQI reporting for PSCell every uplink slot |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on carrier frequency of cell1. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on carrier frequency of cell3. |
| T1 | s | 7 | During this time the PCell/PSCell shall be known and cell3 is detected, and UE shall report a valid CQI for PCell/PSCell. |
| T2 | s | *Ndirect* | During this time the UE shall be configured with directly activated SCell1. |
| T3 | s | 1 | During this time the UE shall report a valid CQI for PCell/PSCell and SCell. |

**Table A.5.5.3.7.1-3: Cell specific test parameters for FR2 SCell activation case with FR2 PSCell**

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

**Table A.5.5.3.7.1-4: OTA related test parameters for FR2 SCell activation case with FR2 PSCell**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 6** | **Unit** | **Cell 2** | | | **Cell 3** | | |
|  |  | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration |  | Setup 1 according to A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -104.7 | | | -104.7 | | |
| Note1 | dBm/SCSNote3 | -95.7 | | | -95.7 | | |
|  | dB | 7 | | | 7 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -88.7 | | | -88.7 | | |
|  | dB | 7 | | | 7 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -58.92 | | | -58.92 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: 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 and 2  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

A.5.5.3.7.2 Test Requirements

The UE shall accomplish the activation of the SCell no later than subframe m+*Ndirect* as defined in clause 8.3.4.

Time period T3 starts at (m+ *Ndirect*), at which point UE shall be reporting a valid CQI for both PCell/PSCell and SCell.

During T3 the UE shall send CSI reports for SCell with non-zero CQI index and continue to send CSI reports for SCell 1 with non-zero CQI index until the end of T3. All of the above test requirements shall be fulfilled in order for the observed SCell1 direct activation delay to be counted as correct. The rate of correct observed SCell1 direct activation delay during repeated tests shall be at least 90%.

End of THIRD Modification

Unchanged Sections Omitted

FOURTH Modification

A.5.5.6.4 SCell dormancy switch

##### A.5.5.6.4.1 E-UTRAN – NR FR2 PSCell SCell dormancy switch of single FR2 SCell inside active time

###### A.5.5.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify

1) the interruption due to RRM and CSI measurement during SCell dormancy on spCell is within the limits specified in clause 7.32.2.14.2 of 36.133 [15] for E-UTRA victim cell, and clause 8.2.1.2.15.2 and 8.2.1.2.15.3 for NR victim cell, and

2) the SCell dormancy switch delay is within the requirement defined in clause 8.6.2, and the SCell dormancy switch interruption is within the limits defined in clause 8.2.1.2.15.1 for NR victim cell, and clause 7.32.2.14.1 of 36.133 [15] for E-UTRA victim cell.

Supported test configurations are shown in Table A.5.5.6.4.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one NR PSCell (Cell 2) and one NR SCell (Cell 3) as given in Table A.5.5.6.4.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCell are specified in Table A.5.5.6.4.1.1-3 below.

The tests consist of three consecutive time periods T1, T2, and T3, respectively. All cells have constant signal levels throughout the test. The UE is continuously scheduled in PCell and PSCell throughout the test

Before the test starts,

- UE is connected to Cell 1 (PCell), Cell 2 (PSCell) and Cell 3 (SCell).

- UE is configured with a single UE-specific downlink bandwidth part, BWP-0, for Cell 2. BWP-0 includes the bandwidth of the initial DL BWP and SSB.

- UE is configured with one non-dormant and one dormant UE-specific downlink bandwidth part, BWP-0 and BWP-1, respectively, for Cell 3. BWP-0 includes the bandwidth of the initial DL BWP and SSB.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPin Cell 3 is BWP-0.

- UE is indicated that *firstOutsideActiveTimeBWP-Id* that the active DL BWP after when switching from dormant BWPin Cell 3 is BWP-0

T1 starts at the point in time at which the UE receives a DCI with dormancy indication on PDCCH in PSCell at the antenna connector, in a slot # denoted *m*, pertaining to dormancy indication for switching SCell from non-dormancy to dormancy. The UE shall complete switching of the SCells to dormancy by the end of slot *m* + ceil(TBWPswitchDelay/NR slot length) + 1 in Test1, and slot *m* + ceil(TBWPswitchDelay/NR slot length) + 2 in Test2, as specified in clause 8.6.2. Any PCell interruptions due to the switching between non-dormant and dormant BWPs shall fulfill requirements in clause 7.32.2.14.1 of 36.133 [15] for E-UTRA victim cell. Any PSCell interruptions due to the switching between non-dormant and dormant BWPs shall fulfill requirements in clause 8.2.1.2.15.1 for NR victim cell. The test equipment verifies that interruptions due to switching from non-dormancy to dormancy are within the requirements by analysing HARQ feedback transmitted in PCell for PCell and in PSCell for PSCell.

During T2, the UE is carrying out CSI and RRM measurements on dormant SCell. Any PCell interruptions due to CSI and RRM measurements shall fulfill requirements in clause 7.32.2.14.2 of 36.133 [15] for E-UTRA victim cell, and clause 8.2.1.2.15.2 and 8.2.1.2.15.3 for NR victim cell. The test equipment verifies that the interruptions are within the allowed percentages by counting ACK/NACKs in PCell and PSCell. At the end of T2, the test equipment transmits a DCI with dormancy indication on PDCCH in PCell carrying a dormany indication for switching SCell from dormancy to non-dormancy.

T3 starts at the point in time at which the UE receives a DCI with dormancy indication on PDCCH in PSCell at the antenna connector, in a slot # denoted *n*, pertaining to dormancy indication for switching SCell from dormancy to non-dormancy. The UE shall complete switching of the SCell to non-dormancy by the end of slot *n* + ceil(TBWPswitchDelay/NR slot length) + 1 in Test1, and slot *n* + ceil(TBWPswitchDelay/NR slot length) + 2 in Test2, as specified in clause 8.6.2. Any PCell interruptions due to the switching between non-dormant and dormant BWPs shall fulfill requirements in clause 7.32.2.14.1 of 36.133 [15] for E-UTRA victim cell. Any PSCell interruptions due to the switching between non-dormant and dormant BWPs shall fulfill requirements in clause 8.2.1.2.15.1 for NR victim cell. The test equipment verifies that interruptions due to switching from dormancy to non-dormancy are within the requirements by analysing HARQ feedback transmitted in PCell for PCell, and in PSCell for PSCell. PDCCHs indicating new transmissions shall be sent continuously on SCell from the slot right after *n* + ceil(TBWPswitchDelay/NR slot length) + 1 in Test1, and slot *n* + ceil(TBWPswitchDelay/NR slot length) + 2 in Test2. The test equipment verifies the SCell dormancy switch delay by counting the slots from slot n till an ACK/NACK for SCell is received.

There are two subtests in this test. In Subtest 1 the DCI format 1\_1 command for SCell dormancy switch is transmitted within the first 3 OFDM symbols in a slot, and in Subtest 2 the DCI format 1\_1 command for SCell dormancy switch is transmitted after the first 3 OFDM symbols in a slot. A UE that only supports triggering during within the first three OFDM symbols of a slot shall only undergo Test1, whereas a UE that supports triggering also in remaining OFDM symbols of a slot shall undergo Test1 and Test2*.*

Table A.5.5.6.4.1.1-1: Dormancy switch supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: A UE which fulfils the requirements in test case in clause A.5.5.6.4.2 can skip the test cases in current clause A.5.5.6.4.1.  Note 3: NR configuration is the same for PSCell and SCells. | |

Table A.5.5.6.4.1.1-2: General test parameters for Dormancy switch in synchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | Comment |
| Subtest 1 | Subtest 2 |
| E-UTRA RF Channel Number |  | 1 | | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2, 3 | | Two NR radio channel is used for this test |
| Active PCell |  | Cell 1 | | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | | PSCell on RF channel number 2. |
| Active SCell |  | Cell 3 | | SCell on RF channel number 3. |
| CP length |  | Normal | |  |
| DRX |  | OFF | |  |
| Measurement gap pattern Id |  | OFF | |  |
| *bwp-InactivityTimer* | ms | 500 | |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | | Individual offset for cells on PSCC. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | | Individual offset for cells on SCC. |
| Cell2 timing offset to cell1 | μs | 3 | | Synchronous EN-DC |
| Cell3 timing offset to cell2 | μs | 0 | | Synchronous cells |
| Triggering DCI format |  | DCI 1\_1 | | Triggering DCI format for triggering during active time |
| OFDM symbol range in slot for transmission of DCI with dormancy indication |  | 0 – 2 | 3 – 11 | Test1 is based on that triggering DCI is received within the first three OFDM symbols of a slot. Test2 is based on that the triggering DCI is received later than within the first three OFDM symbols of a slot. |
| T1 | s | 0.2 | |  |
| T2 | s | 5 | |  |
| T3 | s | 0.2 | |  |

Table A.5.5.6.4.1.1-3: NR Cell specific test parameters for Dormancy switch in synchronous EN-DC

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Subtest 1 | | Subtest 2 | |
| Cell 2 | Cell 3 | Cell 2 | Cell 3 |
| Frequency Range |  | FR2 | | FR2 | |
| Duplex mode |  | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel |  | 100 MHz: NRB,c = 66 | | 100 MHz: NRB,c = 66 | |
| Active BWP ID |  | 0 | 0 | 0 | 0 |
| Initial DL BWP Configuration |  | DLBWP.0.2 | DLBWP.0.2 | DLBWP.0.2 | DLBWP.0.2 |
| Active DL BWP-0 Configuration |  | DLBWP.1.1 | DLBWP.1.1 | DLBWP.1.1 | DLBWP.1.1 |
| Active DL BWP-1 Configuration |  | NA | DLBWP.1.2 | NA | DLBWP.1.2 |
| Initial UL BWP Configuration |  | ULBWP.0.2 | ULBWP.0.2 | ULBWP.0.2 | ULBWP.0.2 |
| Active UL BWP-0 Configuration |  | ULBWP.1.1 | ULBWP.1.1 | ULBWP.1.1 | ULBWP.1.1 |
| Active UL BWP-1 Configuration |  | NA | ULBWP.1.2 | NA | ULBWP.1.2 |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET parameters |  | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET parameters |  | CCR.3.1 TDD | | CCR.3.2 TDD | CCR.3.1 TDD |
| OCNG Patterns |  | OP.1 | | OP.1 | |
| SSB Configuration |  | SSB.1 FR2 | | SSB.1 FR2 | |
| SMTC Configuration |  | SMTC.1 | | SMTC.1 | |
| TCI State |  | TCI.State.0 | | TCI.State.0 | |
| TRS Configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | |
| CSI-RS for CSI reporting |  | CSI-RS.3.1 TDD | | CSI-RS.3.1 TDD | |
| CSI reporting periodicity | slots | 640 | | 640 | |
| SCell measurement cycle (measCycleSCell) | ms | 640 | | 640 | |
| Antenna Configuration |  | 1x2 | | 1x2 | |
| Propagation Condition |  | AWGN | | AWGN | |
| EPRE ratio of PSS to SSS | dB | 0 | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3. | | | | | |

Table A.5.5.6.4.1.1-4: OTA related test parameters for Dormancy switch in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | Cell 3 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15 | |
| NocNote 1 | dBm/15 kHz | -112 | -112 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -85 | -85 |
| Ês/Iot | dB | 18 | 18 |
| IoNote2 | dBm/95.04 MHz Note4 | -56 | -56 |
| 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 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone. | | | |

###### A.5.5.6.4.1.2 Test Requirements

During T1, any interruption on PCell and PSCell due to dormancy switching of SCell shall be within the requirement specified in in clause 8.2.1.2.15.1 for NR victim cell, and clause 7.32.2.14.1 of 36.133 [15] for E-UTRA victim cell.

During T2, interruptions on PCell and PSCell due to CSI and RRM measurements on dormant SCell shall be within the interruption rate requirements specified in 8.2.1.2.15.1 for NR victim cell, and clause 7.32.2.14.1 of 36.133 [15] for E-UTRA victim cell.

During T3, any interruption on PCell and PSCell due to dormancy switching of SCell shall be within the requirement specified in in clause 8.2.1.2.15.1 for NR victim cell, and clause 7.32.2.14.1 of 36.133 [15] for E-UTRA victim cell. Monitoring of PDCCH for SCell in PSCell shall be resumed within the dormancy switching time specified in clause 8.6.2A.

For an event to be considered to be correct, all requirements above have to be fulfilled.

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

##### A.5.5.6.4.2 E-UTRAN – NR FR1 PSCell SCell dormancy switch of two FR2 SCells outside active time

###### A.5.5.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify the NR SCell dormant BWP switch delay requirement defined in clause 8.6.2A.1, interruption requirements due to the NR SCell dormant BWP switch defined in clause 8.2.1.2.15.1 for NR victim cells and in clause 7.32.2.14.1 of TS36.133 for E-UTRA victim cell, respectively, and interruption requirements due to CSI and RRM measurements on the NR dormant SCells defined in clauses 8.2.1.2.15.2 and 8.2.1.2.15.3 for NR victim cells and in clause 7.32.2.14.2 of TS36.133 for E-UTRA victim cell, respectively. Supported test configurations are shown in Table Table A.5.5.6.4.2.1-1.

The general test parameters are given in Table A.5.5.6.4.2.1-2, and NR cell specific test parameters are given in Table A.5.5.6.4.2.1-3 and Table A.5.5.6.4.2.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one NR FR1 PSCell (Cell 2), and three NR FR2 SCells (Cell 3-5) as given in Table A.5.5.6.4.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCell are specified in Table A.5.5.6.4.2.1-3 and Table A.5.5.6.4.2.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1), PSCell (Cell 2), and SCell (Cell 5) to ensure that the UE will have ACK/NACK sending except the time before T1 and during T3. PDCCHs indicating new transmissions shall be sent continuously on SCells (Cell 3,4) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on the cells and the time duration of when active BWP of the cell is dormant.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC), and Cell 3-5 (SCells) on radio channels 3-5 (SCCs), respectively.

- UE is configured with 2 different UE-specific downlink BWPs for Cell 3 and Cell 4, BWP-1 and BWP-2. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB. Here, BWP-2 on Cell 3 and Cell 4 is configured as dormant BWP.

- UE is configured with 1 UE-specific downlink BWP the same as initial BWP for Cell 3 and Cell 4.

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 in Cell 3 and Cell 4.

- UE is configured with DRX.

- UE is configured to monitor PDCCH for DCI format 2\_6 from Cell 2 at *ps-Offset* before the start of *onDuration*. *ps-Offset* is selected to correspond to the dormancy switching time specified in clause 8.6.2A.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, T3, and T4, respectively.

During T1,

Time period T1 starts when a DCI format 2\_6 command for Cell 3 and Cell 4 DL BWP switch to BWP-2, sent from the test equipment to the UE, is received at the UE side in PSCell’s slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell’s DL slot (*i+* TMultipleBWPswitchDelay+X) as defined in clause 8.6.2A.2. The UE shall be continuously scheduled on the cell starting from the beginning of the DL slot right after slot (*i+* TMultipleBWPswitchDelay+X).

The UE shall be able to receive PDSCH at the beginning of the DL slot right after SCell(Cell 5)’s DL slot (*i+* TMultipleBWPswitchDelay+X) as defined in clause 8.6.2A.2. The UE shall be continuously scheduled on the cell starting from the beginning of the DL slot right after slot (*i+* TMultipleBWPswitchDelay+X).

PCell(Cell 1) interruption due to dormant BWP switch on PSCell shall occur within the dormant BWP switch delay.

SCell(Cell 5) interruption due to dormant BWP switch on SCell(Cell 5) shall occur within the dormant BWP switch delay.

During T2,

Time period T2 starts when dormant BWP switch latency requirement test is completed. The test equipement shall schedule PDSCH every slot.

The UE shall be able to report ACK/NACK corresponding to the scheduled PDSCH to PSCell except for the allowed times as defined in clauses 8.2.1.2.15.2 and 8.2.1.2.15.3.

The UE shall be able to report ACK/NACK corresponding to the scheduled PDSCH to PCell except for the allowed times as defined in clause 7.32.2.14.2 of TS36.133.

During T3,

Time period T3 starts when interruption due to SSB based RRM measurement and CSI measurement requirements test is completed. Test equipment shall not transmit PDCCH, hence, the UE doesn’t monitor PDCCH except DCI format 2\_6 based PDCCH.

During T4,

Time period T4 starts when a DCI format 2\_6 command for Cell 3 and Cell 4 DL BWP switch to BWP-1, sent from the test equipment to the UE, is received at the UE side in PSCell’s slot # denoted *j*. The UE shall switch its bandwidth part from BWP-2 to BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell’s DL slot (*j+* TMultipleBWPswitchDelay+X) as defined in clause 8.6.2A.2. The UE shall be continuously scheduled on the cell starting from the beginning of the DL slot right after slot (*j+* TMultipleBWPswitchDelay+X).

The UE shall be able to receive PDSCH at the beginning of the DL slot right after all SCell’s (Cell 3,4,5) DL slot (*j+* TMultipleBWPswitchDelay+X) as defined in clause 8.6.2A.2. The UE shall be continuously scheduled on the cells starting from the beginning of the DL slot right after slot (*j+* TMultipleBWPswitchDelay+X).

PCell(Cell 1) interruption due to dormant BWP switch on PSCell shall occur within the dormant BWP switch delay.

SCell(Cell 5) interruption due to dormant BWP switch on SCell(Cell 5) shall occur within the dormant BWP switch delay.

Table A.5.5.6.4.2.1-1: Supported test configurations for EN-DC DCI 2\_6 based Domant BWP Switch on Multiple NR FR2 SCells

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Config | Cell 1 | Cell 2 | Cell 3, Cell 4, Cell 5 | DCI 2\_6 of Cell 2 |
| 1 | LTE FDD | 15kHz SSB SCS, FDD | 120kHz SSB SCS, TDD | within 3 OFDM symbols |
| 2 | LTE FDD | 15kHz SSB SCS, TDD | 120kHz SSB SCS, TDD | within 3 OFDM symbols |
| 3 | LTE FDD | 30kHz SSB SCS, TDD | 120kHz SSB SCS, TDD | within 3 OFDM symbols |
| 4 | LTE TDD | 15kHz SSB SCS, FDD | 120kHz SSB SCS, TDD | within 3 OFDM symbols |
| 5 | LTE TDD | 15kHz SSB SCS, TDD | 120kHz SSB SCS, TDD | within 3 OFDM symbols |
| 6 | LTE TDD | 30kHz SSB SCS, TDD | 120kHz SSB SCS, TDD | within 3 OFDM symbols |
| 7 | LTE FDD | 15kHz SSB SCS, FDD | 120kHz SSB SCS, TDD | after 3 OFDM symbols |
| 8 | LTE FDD | 15kHz SSB SCS, TDD | 120kHz SSB SCS, TDD | after 3 OFDM symbols |
| 9 | LTE FDD | 30kHz SSB SCS, TDD | 120kHz SSB SCS, TDD | after 3 OFDM symbols |
| 10 | LTE TDD | 15kHz SSB SCS, FDD | 120kHz SSB SCS, TDD | after 3 OFDM symbols |
| 11 | LTE TDD | 15kHz SSB SCS, TDD | 120kHz SSB SCS, TDD | after 3 OFDM symbols |
| 12 | LTE TDD | 30kHz SSB SCS, TDD | 120kHz SSB SCS, TDD | after 3 OFDM symbols |
| Note 1: 10 MHz bandwidth for Cell 2 with 15kHz SSB SCS.  Note 2: 40 MHz bandwidth for Cell 2 with 30kHz SSB SCS.  Note 3: 100 MHz bandwidth for Cell 3,4,5.  Note 4: The UE is only required to be tested in one of the supported test configurations. | | | | |

Table A.5.5.6.4.2.1-2: General test parameters for EN-DC DCI 2\_6 based Domant BWP Switch on Multiple NR FR2 SCells

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRAN carrier frequenciy is used. |
| NR RF Channel Number |  | 2,3,4,5 | Four NR radio channels are used for this test. RF channel number 2 is in FR 1 and RF channel numbers 3,4,5 are in a band where intra-band FR2 CA is allowed. |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Active PSCell |  | Cell 2 | Primary SCG cell on NR RF channel number 2. |
| Configured activated SCell |  | Cell 3,4,5 | Configured activated secondary cell on NR RF channel numbers 3,4,5. |
| CP length |  | Normal |  |
| DRX |  | DRX.3 | As specified in clause A.3.3 |
| ps-Offset |  | Depending on UE capability | Monitoring of DCI 2\_6 ahead of start of drx-onDurationTimer. Value of ps-Offset shall correspond to SCell dormancy switching time for switching of two SCells, as specified in clause 8.6.2A. Actual value depends on reported UE capabilities. |
| ps-WakeUp |  | true | Wake up for onDuration in case DCI format 2\_6 is not detected. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 3 |  |
| Cell3,4,5 timing offset to cell1 | μs | 3 |  |
| Timing offset among cell3,4,5 | μs | 0 |  |
| T1 | s | 0.2 | During this time cell 3,4 switch to dormancy from non-dormancy. |
| T2 | s | 10 | During this time cell 3,4 are dormant. |
| T3 | S | 0.1 | During this time PDCCH is not transmitted from all cells. |
| T4 | s | 0.2 | During this time cell 3,4 switch to non-dormancy from dormancy. |

Table A.5.5.6.4.2.1-3: Cell specific test parameters for EN-DC DCI 2\_6 based Domant BWP Switch on Multiple NR FR2 SCells

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | Cell 3,4 | Cell 5 |
| Frequency range |  |  | FR1 | FR2 | FR2 |
| Duplex mode |  |  | FDD | TDD | TDD |
| TDD configuration | Config 1,4,7,10 |  | NA | TDDConf.3.1 | TDDConf.3.1 |
| Config 2,5, 8,11 |  | TDDConf.1.1 | TDDConf.3.1 | TDDConf.3.1 |
| Config 3,6,9,12 |  | TDDConf.2.1 | TDDConf.3.1 | TDDConf.3.1 |
| BWchannel | Config 1,2,4,5,7,8,10,11 | MHz | 10: NRB,c = 52 | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Config 3,6,9,12 | MHz | 40: NRB,c = 106 | 100: NRB,c = 66 | 100: NRB,c = 66 |
| SSB Configuration | Config 1,2,4,5,7,8,10,11 |  | SSB.1 FR1 | SSB.1 FR2 | SSB.1 FR2 |
| Config 3,6,9,12 |  | SSB.2 FR1 | SSB.1 FR2 | SSB.1 FR2 |
| Downlink initial BWP Configuration |  |  | DLBWP.0.2 | DLBWP.0.2 | DLBWP.0.2 |
| Active (non-dormant) DL BWP-1 Configuration |  |  | NA | DLBWP.1.1 | NA |
| Active (dormant) DL BWP-2 Configuration |  |  | NA | DLBWP.1.1 | NS |
| Uplink initial BWP Configuration |  |  | ULBWP.0.2 | ULBWP.0.2 | ULBWP.0.2 |
| Active Uplink BWP-1 Configuration |  |  | NA | ULBWP.1.1 | NA |
| Active Uplink BWP-2 Configuration |  |  | NA | ULBWP.1.1 | NA |
| SMTC Configuration |  |  | SMTC.1 | SMTC.1 | SMTC.1 |
| TRS configuration | Config 1,4,7,10 |  | TRS.1.1 FDD | TRS.2.1 TDD | TRS.2.1 TDD |
| Config 2,5, 8,11 |  | TRS.1.1 TDD | TRS.2.1 TDD | TRS.2.1 TDD |
| Config 3,6,9,12 |  | TRS.1.2 TDD | TRS.2.1 TDD | TRS.2.1 TDD |
| TCI state |  |  | TCI.State.0 | TCI.State.0 | TCI.State.0 |
| PDSCH Reference measurement channel | Config 1,4,7,10 |  | SR.1.1 FDD | SR.3.1 TDD | SR.3.1 TDD |
| Config 2,5, 8,11 |  | SR.1.1 TDD | SR.3.1 TDD | SR.3.1 TDD |
| Config 3,6,9,12 |  | SR.2.1 TDD | SR.3.1 TDD | SR.3.1 TDD |
| RMSI CORESET Parameters | Config 1,4,7,10 |  | CR.1.1 FDD | CR.3.1 TDD | CR.3.1 TDD |
| Config 2,5, 8,11 |  | CR.1.1 TDD | CR.3.1 TDD | CR.3.1 TDD |
| Config 3,6,9,12 |  | CR.2.1 TDD | CR.3.1 TDD | CR.3.1 TDD |
| Dedicated CORESET Parameters for scheduling PDCCH | Config 1,4 |  | CCR.1.1 FDD | CCR.3.1 TDD | CCR.3.1 TDD |
| Config 7,10 |  | CCR.1.5 FDD | CCR.3.1 TDD | CCR.3.1 TDD CCR.3.1 TDD |
| Config 2,5 |  | CCR.1.1 TDD | CCR.3.1 TDD | CCR.3.1 TDD |
| Config 8,11 |  | CCR.1.5 TDD | CCR.3.1 TDD | CCR.3.1 TDD |
| Config 3,6 |  | CCR.2.1 TDD | CCR.3.1 TDD | CCR.3.1 TDD |
| Config 9,12 |  | CCR.2.3 TDD | CCR.3.1 TDD | CCR.3.1 TDD |
| Dedicated CORESET Parameters for DCI 2\_6 | Config 1,4 |  | CCR.1.1 FDD | NA | NA |
| Config 7,10 |  | CCR.1.5 FDD | NA | NA |
| Config 2,5 |  | CCR.1.1 TDD | NA | NA |
| Config 8,11 |  | CCR.1.5 TDD | NA | NA |
| Config 3,6 |  | CCR.2.1 TDD | NA | NA |
| Config 9,12 |  | CCR.2.3 TDD | NA | NA |
| CSI-RS configuration |  |  | NA | CSI-RS.3.1 TDD | NA |
| OCNG Patterns |  |  | OP.1 | | |
| EPRE ratio of PSS to SSS |  | dB | 0 | 0 | 0 |
| EPRE ratio of PBCH\_DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH\_DMRS |  |
| EPRE ratio of PDCCH\_DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS |  |
| EPRE ratio of PDSCH\_DMRS to SSS |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS |  |
| EPRE ratio of OCNG DMRS to SSSNote 1 |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |
| Propagation conditions |  |  | 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. | | | | | |

Table A.5.5.6.4.2.1-4: OTA related test parameters for EN-DC DCI 2\_6 based Domant BWP Switch on Multiple NR FR2 SCells

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 2 | Cell 3,4 | Cell 5 |
| Angle of arrival configuration |  | N/A  Link only, see clause A.3.7A | Setup 1 defined in clause A.3.15.1 | |
| Assumption for UE beams Note 7 |  | Fine | Fine |
| Note1 | dBm/15kHzNote4 | -111.7 | -111.7 |
| Note1 | dBm/SCSNote3 | -102.7 | -102.7 |
|  | dB | 7 | 7 |
| SS-RSRPNote2 | dBm/SCS Note4 | -95.7 | -95.7 |
|  | dB | 7 | 7 |
| IoNote2 | dBm/95.04 MHz Note4 | -65.9 | -65.9 |
| 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 and 2  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | |

###### A.5.5.6.4.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after PSCell’s DL slot (*i+* TMultipleBWPswitchDelay+X) as defined in clause 8.6.2A.2.

During T2, the UE shall transmit at least 98.5% of ACK/NACK on NR PCell.

During T4, the UE shall start to send the ACK for PSCell in the DL slot right after PSCell’s DL slot (*j+* TMultipleBWPswitchDelay+X) as defined in clause 8.6.2A.2.

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

During T1, the start of the interruption of PCell and SCell (Cell 5) during dormant BWP switch on SCells (Cell 3,4) shall not happen outside the dormant BWP switch delay.

During T1, the start of the interruption of PCell and SCells (Cell 3,4,5) during dormant BWP switch on SCells (Cell 3,4) shall not happen outside the dormant BWP switch delay.

End of FOURTH Modification

Unchanged Sections Omitted

FIFth Modification

A.6.5.3.5 Direct SCell activation at handover with known SCell in FR1

A.6.5.3.5.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD and TDD-TDD intra frequency handover with direct SCell activation requirements specified in subclause 8.3.5.

Supported test configurations are shown in table A.6.5.3.5.1-1. Both handover with direct SCell activation requirements are tested by using the parameters in table A.6.5.3.5.1-2, and A.6.5.3.5.1-3.

The test scenario comprises of three NR FDD or NR TDD FR1 carriers and the 3 cells as given in tables A.6.5.3.5.1-1 and A.6.5.3.5.1-2. 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 and SCell1 (cell 2) is in activated state and UE is reporting CQI for both PCell and SCell1.

Time period T2 starts when UE receives a handover command to Cell 3 that also activates SCell1 (Cell2). This is done using an *RRCReconfiguration* message with parameter *sCellState* set to *activated* for the SCell1 (Cell 2). The message is sent from the test equipment to the UE and is received in a subframe # denoted n at the UE antenna connector. The UE shall accomplish the activation of the SCell no later than subframe (n +Ndirect).

Time period T3 starts at (n +Ndirect), at which point UE shall be reporting a valid CQI for both PCell and SCell1.

**Table A.6.5.3.5.1-1: Intra-frequency handover with direct SCell activation from FR1 to FR1 test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  SCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  SCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | PCell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  SCell: 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.6.5.3.5.1-2: General test parameters Intra-frequency handover with direct SCell activation from FR1 to FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | PCell |  | Cell 1 |  |
| SCell |  | Cell 2 |  |
| Target cell |  | Cell 3 |  |
| Final condition | PCell |  | Cell 3 |  |
| SCell |  | Cell 2 |  |
| neighbour cell |  | Cell 1 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | FR1 PRACH configuration 1 | As specified in table Table 6.3.3.2-3 in TS 38.211 [6] |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 | UE is in connected mode with PCell and SCell1 (cell 2) is in activated state. UE receives a handover command |
| T2 | | s | Ndirect | UE shall accomplish the activation of the SCell |
| T3 | | s | 1 |  |
| THARQ | | slot | k | k is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| TCSI\_Reporting | | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |
| k | | ms |  | As specified in clause 4.3 of TS 38.213 [3] |

**Table A.6.5.3.5.1-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover with direct SCell activation test case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | | **Cell 2** | | | **Cell 3** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| NR RF Channel Number | |  | 1 | | | 2 | | | 1 | | |
| Duplex mode | Config 1 |  | FDD | | | | | | | | |
| Config 2,3 | TDD | | | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | | | | | | |
| Config 2 | TDDConf.1.1 | | | | | | | | |
| Config 3 | TDDConf.2.1 | | | | | | | | |
| BWchannel | Config 1 | MHz | 10: NRB,c = 52 | | | | | | | | |
| Config 2 | 10: NRB,c = 52 | | | | | | | | |
| Config 3 | 40: NRB,c = 106 | | | | | | | | |
| BWP BW | Config 1 | MHz | 10: NRB,c = 52 | | | | | | | | |
| Config 2 | 10: NRB,c = 52 | | | | | | | | |
| Config 3 | 40: NRB,c = 106 | | | | | | | | |
| DRx Cycle | | ms | Not Applicable | | | | | | | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | | | | | |
| Config 2 | SR.1.1 TDD | | | | | | | | |
| Config 3 | SR2.1 TDD | | | | | | | | |
| CORESET Reference Channel | Config 1 |  | CR.1.1 FDD | | | | | | | | |
| Config 2 | CR.1.1 TDD | | | | | | | | |
| Config 3 | CR2.1 TDD | | | | | | | | |
| TRS configuration | Config 1 |  | TRS.1.1 FDD | | | | | | | | |
| Config 2 |  | TRS.1.1 TDD | | | | | | | | |
| Config 3 |  | TRS.1.2 TDD | | | | | | | | |
| OCNG Patterns | |  | OCNG pattern 1 | | | | | | | | |
| SMTC Configuration | |  | SMTC pattern 1 | | | | | | | | |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | | | | | | | | |
| Config 3 | SSB.2 FR1 | | | | | | | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2 | kHz | 15 kHz | | | | | | | | |
| Config 3 | 30 kHz | | | | | | | | |
| PUCCH/PUSCH subcarrier spacing | Config 1,2 | kHz | 15 kHz | | | | | | | | |
| Config 3 | 30 kHz | | | | | | | | |
| PRACH configuration | |  | FR1 PRACH configuration 1 | | | | | | | | |
| BWP configuraiton | Initial DL BWP |  | DLBWP.0.1 | | | | | | | | |
| Dedicated DL BWP |  | DLBWP.1.1 | | | | | | | | |
| Initial UL BWP |  | ULBWP.0.1 | | | | | | | | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | | | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Note2 | | dBm/15kHz | -98 | | | | | | | | |
| Note2 | Config 1,2 | dBm/SCS | -98 | | | | | | | | |
| Config 3 | -95 | | | | | | | | |
|  | | dB | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
|  | | dB | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| SSB\_RP | Config 1,2 | dBm/SCS | -90 | -90 | -90 | -90 | -90 | -90 | -90 | -90 | -90 |
| Config 3 | dBm/SCS | -87 | -87 | -87 | -87 | -87 | -87 | -87 | -87 | -87 |
| IoNote3 | Config 1,2 | dBm/  9.36MHz | -61.41 | -57.06 | -57.06 | -61.41 | -57.06 | -61.41 | -57.06 | -57.06 | -61.41 |
| Config 3 | dBm/  38.16MHz | -55.31 | -50.96 | -50.96 | -55.31 | -50.96 | -55.31 | -50.96 | -50.96 | -55.31 |
| Propagation condition | | - | AWGN | | | AWGN | | | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | | |

A.6.5.3.5.2 Test Requirements

The UE shall be capable to transmit valid CSI report for the directly activated SCell1 no later than in subframe n+Ndirect.

The rate of correct observed SCell1 direct activation delay during repeated tests shall be at least 90%.

NOTE: 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 [2],

Tinterrupt: Interruption time during handover as specified in clause 6.1.1,

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:

- TFirstSSB: the time to the end of the first complete SSB burst indicated by the SMTC after slot n + (𝑇𝑅𝑅𝐶\_𝑃𝑟𝑜𝑐𝑒𝑠𝑠+𝑇𝑖𝑛𝑡𝑒𝑟𝑟𝑢𝑝𝑡+𝑇2+𝑇3)/(*N*𝑅 𝑠𝑙𝑜𝑡 𝑙𝑒𝑛𝑔𝑡ℎ)

- TFirstSSB\_MAX: the time to the end of the first complete SSB burst indicated by the SMTC after slot n + (𝑇𝑅𝑅𝐶𝑃𝑟𝑜𝑐𝑒𝑠𝑠+𝑇𝑖𝑛𝑡𝑒𝑟𝑟𝑢𝑝𝑡+𝑇2+𝑇3)/(*N*𝑅 𝑠𝑙𝑜𝑡 𝑙𝑒𝑛𝑔𝑡ℎ)

This gives a total of Ndirect = 10 + 52 *+* TIU + T2 + T3+ Tactivation\_time + TCSI\_Reporting - 3 ms = 62 + 10 + 13 + 6 + 20 + 2 - 3 = 94 ms for test configurations 1 and 2.

This gives a total of Ndirect = 10 + 52 *+* TIU + T2 + T3+ Tactivation\_time + TCSI\_Reporting - 3 ms = 62 + 10 + 13 + 6 + 20 + 2 - 3 = 94 ms for test configuration 3.

During T3 the UE shall send valid CSI reports for PCell and SCell1 with non-zero CQI index and continue to send CSI reports for PCell and SCell1 (Cell 2) with non-zero CQI index until the end of T3.

All of the above test requirements shall be fulfilled in order for the observed SCell1 direct activation delay to be counted as correct.

End of FIFth Modification

Unchanged Sections Omitted

SIXth Modification

A.7.5.6.4 SCell dormancy switch

A.7.5.6.4.1 NR FR2 PCell SCell dormancy switch of single FR2 SCell inside active time

A.7.5.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the Dormant SCell BWP switch delay requirements are within the requirements stated in section 8.6 for UE configured with a single downlink SCell, when the dormancy indication is received in any of the first 3 OFDM symbols or is received after the first 3 OFDM symbols.

The Supported test configurations are given in Table A.7.5.6.4.1.1-1. The test parameters are given in Tables A.7.5.6.4.1.1-2 and cell-specific parameters in A.7.5.6.4.1.1-3 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 A6 is used The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. There are two carriers both in FR2, with one cell on the PCC and 2 cells on SCC. Cell 1, Cell 2 and Cell 3 operate in either FDD or TDD duplex mode according to test configuration. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) with configured and activated SCell (SCell1) on radio channel 2 (SCC1). The UE is not aware of Cell 3 on radio channel 2 (SCC1). The UE is reporting CSI and shall not report CQI index 0 (out-of-range) in the available uplink resources to report CQI for the SCell. The UE shall be continuously scheduled in the PCell throughout the whole test.

The UE receives a DCI-based BWP switch command by which the SCell1 (Cell 2) is requested to switch the active BWP to the dormant BWP.

The point in time at which the DCI message is received at the UE antenna connector, in a subframe # denoted n, defines the start of time period T1. The UE shall accomplish the BWP switch to the dormant BWP latest in subframe (n + TBWPswitchDelay + X). The UE shall continue to shall report valid CQI if the UE has available uplink resources to report CQI for the dormant SCell. The UE shall continue to shall report L1-RSRP if the UE has available uplink resources to report L1-RSRP for the Dormant SCell. Any PCell interruption due to BWP switch on the SCell shall occur in the subframes n to (n+ TBWPswitchDelay + X).

Time T2 start at T1 + (TBWPswitchDelay + X). During T2 the UE shall continue to measure and report CQI and L1-RSRP in the available uplink resources to report CQI and L1-RSRP for the SCell.

Time T3 starts at T2 + 500ms. During T3 the UE shall continue to measure and report CQI and L1-RSRP in the available uplink resources to report CQI and L1-RSRP for the SCell.

Starting at T4 = T3 + 500ms, Cell 3 becomes detectable. During T3 the UE shall continue to measure and report CQI and L1-RSRP in the available uplink resources to report CQI and L1-RSRP for the SCell. The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T4. The UE is not required to read the neighbour cell SSB index in this test.

At time T5 starting at T4 + 1500ms a a DCI-based BWP switch command by which the SCell1 (Cell 2) is requested to switch the active BWP to the non-dormant BWP.

The point in time at which the DCI message is received at the UE antenna connector, in a subframe # denoted n, defines the start of time period T6. The UE shall accomplish the BWP switch to the non-dormant BWP latest in subframe (n + TBWPswitchDelay + X). The UE shall continue to shall report valid CQI if the UE has available uplink resources to report CQI for the non-dormant SCell. The UE shall continue to shall report L1-RSRP if the UE has available uplink resources to report L1-RSRP for the non-dormant SCell. Any PCell interruption due to BWP switch on the SCell shall occur in the subframes n to (n+ TBWPswitchDelay + X).

During T2, T3 and T4 the total rate of ACK/NACK feedback loss on any non-dormant serving cell resulting from CQI measurements and RRM measurements, clause 8.2.2.2.12.3, on dormant SCells, shall not exceed [0.5]%.

During T2, T3 and T4 the total rate of ACK/NACK feedback loss on any non-dormant serving cell resulting from L1-RSRP measurements and RRM measurements, clause 8.2.2.2.12.x, on dormant SCells, shall not exceed [0.5]%.

During T2, T3 and T4 the total rate of ACK/NACK feedback loss on any non-dormant serving cell resulting from RRM measurements and RRM measurements, clause 8.2.2.2.12.3, on dormant SCells, shall not exceed [0.5]%

During T1, T2, T3, T4, T5 and T6, the UE shall be continuously scheduled in the SCell1.

**Table A.7.5.6.4.1.1-1: Supported test configurations**

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

**Table A.7.5.6.4.1.1-2: General test parameters for dormancy SCell in NR SA with PCell and SCell in FR2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | | | | **Comment** |
| **Test 1** | **Test 2** | **Test 3** | **Test 4** |
| PCell |  | 1 | Cell 1 | | | |  |
| SCell |  | 1 | Cell 2 | | | |  |
| Neighbour cell |  | 1 | Cell 3 | | | | Cell to be identified. |
| RF Channel Number |  | 1 | 1 | | | | cell 1 |
| RF Channel Number |  | 1 | 2 | | | | Cell 2 and Cell 3 |
| Measurement gap type |  | 1 |  | | | | No measurement gaps configured |
| SSB configuration |  | 1 | SSB.1 FR2 | | | | for all cells |
| SMTC configuration |  | 1 | SMTC.1 | | | | all cells |
| CSI-RS parameters |  | 1 | CSI-RS.3.2 FDD | | | |  |
| CSI reporting periodicity, Non-dormant BWP | ms |  | 2 | | | |  |
| CSI reporting periodicity, Dormant BWP | ms |  | 40 | | | |  |
| Timing offset between the cells | ms |  | 0 | | | |  |
| Triggering DCI format |  |  | 1\_1 | 0\_1 | 1\_1 | 0\_1 | Triggering DCI format |
| OFDM symbol range in slot for transmission of DCI with dormancy indication |  |  | 0 – 2 | | 3 – 11 | | Test1 and Test3 are based on that triggering DCI is received within the first three OFDM symbols of a slot. Test2 and Test4 are based on that the triggering DCI is received after the first three OFDM symbols of a slot |
| A3-Offset | dB | 1 | -4.5 | | | |  |
| 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 | | | |  |
| T1 | s | 1 | 5 | | | |  |
| T2 | s | 1 | 5 | | | |  |

**Table A.7.5.6.4.1.1-3: NR Cell specific test parameters for dormancy SCell in NR SA with PCell and SCell in FR2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1, Cell 2** | | **Cell 3** | |
| **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | SR.3.1 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration, Test 1,2 |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| Dedicated CORESET RMC configuration, Test 3,4 |  |  | CCR.3.2 TDD | | CCR.3.1 TDD | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| Downlink initial BWP configuration |  | 1 | DLBWP.0.1 | | N/A | |
| Uplink initial BWP configuration |  | 1 | ULBWP.0.1 | N/A | N/A | |
| Downlink active non-dormant BWP configuration |  | 1 | N/A | DLBWP.1.2 | N/A | |
| Downlink active dormant BWP configuration |  | 1 | DLBWP.1.2 | | N/A | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | N/A | N/A | |
| RLM-RS |  | 1 | CSI-RS | | N/A | |
| 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 SSSNote 4 |  |
| EPRE ratio of OCNG to OCNG DMRSNote 4 |  |
| Note 2 | dBm/SCS | 1 | -98 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
| Propagation Condition |  | 1 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: OCNG shall be used such that the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols | | | | | | |

A.7.5.6.4.1.2 Test Requirements

During T1 the UE shall switch to the dormant BWP.

During T2, T3, T4 and T5 the UE shall not send ACK/NACK for the PDSCH data scheduled on the SCell.

During T2, T3, T4 and T5 the UE shall continue to send CSI reports for SCell1 with non-zero CQI index.

During T2, T3, T4 and T5 the UE shall continue to send L1-RSRP reports for SCell.

During T4 the UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T4.

During T2, T3, T4 and T5, the missing ACK/NACK sent in PCell shall be less than 1.5% of the total number of the expected ACK/NACK.

During T6, the UE shall send ACK/NACK for the PDSCH data scheduled after subframe (n+ TBWPswitchDelay + X) for the SCell1.

All of the above test requirements shall be fulfilled in order for the observed SCell1 BWP switch delays, Pcell interruption rate, correct CSI and L1-RSRP reporting and event triggeres reporting. The rate of correct observed SCell1 hibernation delay, activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

A.7.5.6.4.2 NR FR1 PCell SCell dormancy switch of two FR2 SCells outside active time

A.7.5.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of SCell dormancy switching delay requirements in clause 8.6.2A when the UE is triggered to switch between non-dormancy and dormancy outside DRX active time. In the tested scenario, the UE is connected to PCell in FR1and two SCells in FR2, and the SCells are switched from non-dormancy to dormancy, and vice versa, at a point in time before start of *onDuration*. The UE is configured to monitor PDCCH for DCI format 2\_6 at *ps-Offset* before the start of *onDuration*. Two tests are specified, where a UE that only supports triggering within the first three OFDM symbols of a slot shall undergo Test1 only, and a UE that supports triggering also in remaining OFDM symbols of a slot shall undergo both Test1 and Test2. In the tested scenario, *ps-Offset* is selected to correspond to the dormancy switching time specified in clause 8.6.2A.

The supported test configurations are provided in Table A.7.5.6.4.2.1-1 below. General test parameters are provided in Table A.7.5.6.4.2.1-2, and cell-specific parameters are provided in Table A.7.5.6.4.2.1-3 below. OTA-related test parameters are provided in Table A.7.5.6.4.2.1-4.

The tests consist of four consecutive time periods, T1, T2, T3 and T4, respectively.

Three carriers are used in the test. Cell 1 (PCell) is on RF channel 1 (PCC) in FR1, and Cell 2 (SCell1) and Cell 3 (SCell2) are on RF channels 2 (SCC1) and 3 (SCC2) in FR2, respectively. All three cells have constant signal levels throughout the test.

Before the test starts,

UE is connected to Cell 1 (PCell), Cell 2 (SCell1) and Cell 3 (SCell2).

UE is configured with a single UE-specific downlink bandwidth part, BWP-0, for Cell 1. BWP-0 includes the bandwidth of the initial DL BWP and SSB.

UE is configured with one non-dormant and one dormant UE-specific downlink bandwidth part, BWP-0 and BWP-1, respectively, for Cell 2 and Cell 3. BWP-0 includes the bandwidth of the initial DL BWP and SSB.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP in Cell 1 is BWP-0.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPin Cell 2 is BWP-0.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPin Cell 3 is BWP-0.

UE is configured with DRX.

UE is configured to monitor DCI format 2\_6, and to be active during *onDuration* even when no DCI format 2\_6 is detected (*ps-WakeUp*).

Time period T1 starts when the UE at *ps-Offset* before *onDuration* detects a DCI format 2\_6 carrying dormancy indication that indicates that SCell1 and SCell2 are to be switched from non-dormancy to dormancy. The UE shall switch active bandwidth parts for SCell1 and SCell2, respectively, from non-dormant BWP-0 to dormant BWP-1. The UE shall complete the switching before the start of *onDuration*. The test equipment schedules the UE continuously with new data indications in PCell starting from beginning of *onDuration*. The test equipment verifies that the UE is transmitting HARQ feedback for PCell from the beginning of *onDuration* and thus verifies that the UE has completed interruptions due to dormancy switching before the start of *onDuration.*

Time period T2 starts when T1 is completed. The test equipment continues to schedule the UE continuously in PCell. The UE shall carry out CSI and RRM measurements on the dormant SCells. The UE shall report ACK/NACK in PCell in response to scheduled PDSCH, with the maximum loss of transmitted ACK/NACKs fulfilling the requirement in clause 8.2.2.2.12. The test equipment verifies that the loss of ACK/NACKs is no larger than 1.5%.

Time period T3 starts when T2 is completed. During T3, the test equipment does not schedule the UE, by which the inactivity timer expires and the UE stops monitoring PDCCH except for signalling using DCI format 2\_6 at wake-up signalling occasions.

Time period T4 starts when the UE at *ps-Offset* before *onDuration* detects a DCI format 2\_6 carrying dormancy indication that indicates that SCell1 and SCell2 are to be switched from dormancy to non-dormancy. The UE shall switch active bandwidth parts for SCell1 and SCell2, respectively, from dormant BWP-1 to non-dormant BWP-0. The UE shall complete the switching before the start of *onDuration*. The test equipment schedules the UE with new data indication in PCell, SCell1 and SCell2 during *onDuration*. The UE shall receive in PCell, SCell1 and SCell2 and send HARQ feedback for PCell, SCell1 and SCell2 via PCell. The test equipment verifies that the UE is transmitting HARQ feedback for PCell, SCell1 and SCell2 from the beginning of *onDuration*, and thus verifies that the UE has completed interruptions due to dormancy switching before the start of *onDuration*.

**Table A.7.5.6.4.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | PCell: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  SCells: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  SCells: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  SCells: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to undergo test for one of the supported test configurations. | |

**Table A.7.5.6.4.2.1-2: General test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | **Comment** |
| **Test1** | **Test2** |
| NR RF Channel Number |  | 1, 2, 3 | | Three NR radio channels are used for this test |
| Active PCell |  | Cell 1 | | PCell on RF channel number 1 in FR1 |
| Active SCell1 |  | Cell 2 | | SCell1 on RF channel number 2 in FR2 |
| Active SCell2 |  | Cell 3 | | SCell2 on RF channel number 3 in FR2 |
| CSI reporting periodicity, Non-dormant BWP | ms | 2 | | CSI reporting periodicity for periodic reporting of CQI for PCell and non-dormant SCells |
| CSI reporting periodicity, Dormant BWP | ms | 40 | | CSI reporting periodicity for periodic reporting of CQI for dormant SCells |
| CP length |  | Normal | |  |
| DRX |  | DRX.8 | | For both PCell and SCells. See clause A.3.3.8. |
| ps-Offset |  | Depending on UE capability | | Monitoring of DCI 2\_6 ahead of start of drx-onDurationTimer. Value of ps-Offset shall correspond to SCell dormancy switching time for switching of two SCells, as specified in clause 8.6.2A. Actual value depends on reported UE capabilities. |
| ps-WakeUp |  | true | | Wake up for onDuration in case DCI format 2\_6 is not detected. |
| Cell 2 timing offset to Cell 1 | µs | <24 | | Timing offset shall be less than MRTD for FR1-FR2 CA, and leave margin for timing difference between Cell2 and Cell3. |
| Cell 3 timing offset to Cell 2 | ns | <260 | | Timing offset shall be less than MRTD for FR2 intra-band non-contiguous CA. |
| OFDM symbol range in slot for transmission of DCI with dormancy indication |  | 0 – 2 | 3 – 11 | Test1 is based on that triggering DCI is received within the first three OFDM symbols of a slot.Test2 is based on that the triggering DCI is received later than within the first three OFDM symbols of a slot. |
| T1 | s | 0.2 | | During this time the SCells are switched from non-dormancy to dormancy. |
| T2 | s | 10 | | During this time the SCells are dormant. |
| T3 | s | 0.2 | | During this time the UE is not scheduled in PCell. |
| T4 | s | 0.2 | | During this time the SCells are switched from dormancy to non-dormancy. |

**Table A.7.5.6.4.2.1-3: Cell specific test parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | **Cell2** | **Cell 3** |
| Frequency Range | |  | FR1 | FR2 | FR2 |
| NR RF channel | |  | 1 | 2 | 3 |
| Duplex mode | Config 1 |  | FDD | TDD | TDD |
| Config 2,3 |  | TDD |
| TDD configuration | Config 1 |  | --- | TDDConf.3.1 | TDDConf.3.1 |
| Config 2 |  | TDDConf.1.1 |
| Config 3 |  | TDDConf.2.1 |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | 100: NRB,c = 66 | 100: NRB,c = 66 |
| Config 3 | 40: NRB,c = 106 |
| Downlink initial BWP Configuration | |  | DLBWP.0.2 | DLBWP.0.2 | DLBWP.0.2 |
| Uplink initial BWP Configuration | |  | ULBWP.0.2 | --- | --- |
| Downlink active non-dormant BWP-0 Configuration | |  | DLBWP.1.1 | DLBWP.1.1 | DLBWP.1.1 |
| Downlink active dormant BWP-1 Configuration | |  | --- | DLBWP.1.1 | DLBWP.1.1 |
| Uplink active BWP-0 Configuration | |  | ULBWP.0.2 | --- | --- |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | SR.3.1 TDD | SR.3.1 TDD |
| Config 2 |  | SR.1.1 TDD |
| Config 3 |  | SR.2.1 TDD |
| CSI-RS configuration for CSI reporting, Non-dormant BWP | Config 1 |  | CSI-RS.1.1 FDD | CSI-RS.3.1 TDD | CSI-RS.3.1 TDD |
| Config 2 |  | CSI-RS.1.1 TDD |
| Config 3 |  | CSI-RS.2.1 TDD |
| CSI-RS configuration for CSI reporting, Dormant BWP | |  | --- | CSI-RS.3.5 TDD | CSI-RS.3.5 TDD |
| TRS configuration | Config 1 |  | TRS.1.1 FDD | TRS.2.1 TDD | TRS.2.1 TDD |
| Config 2 |  | TRS.1.1 TDD |
| Config 3 |  | TRS.1.2 TDD |
| TCI state | |  | TCI.State.0 | TCI.State.0 | TCI.State.0 |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | --- | --- |
| Config 2 |  | CR.1.1 TDD |
| Config 3 |  | CR.2.1 TDD |
| Dedicated CORESET parameters, Test 1,2 | Config 1 |  | CCR.1.1 FDD | CCR.3.1 TDD | CCR.3.1 TDD |
| Config 2 |  | CCR.1.1 TDD |
| Config 3 |  | CCR.2.1 TDD |
| Dedicated CORESET parameters, Test 3,4 | Config 1 |  | CCR.1.5 FDD | CCR.3.1 TDD | CCR.3.1 TDD |
| Config 2 |  | CCR.1.5 TDD |
| Config 3 |  | CCR.2.3 TDD |
| OCNG Patterns | |  | OP.1 | OP.1 | OP.1 |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | SSB.1 FR2 | SSB.1 FR2 |
|  | Config 3 |  | SSB.2 FR1 |
| SMTC Configuration | |  | SMTC.1 | SMTC.1 | SMTC.1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSSNote1 | |
| EPRE ratio of OCNG to OCNG DMRSNote1 | |
| Propagation Condition | |  | N/A  Link only, see clause A.3.7A | AWGN | AWGN |
| Note 1: OCNG shall be used such that the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | |

**Table A.7.5.6.4.2.1: OTA related test parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** | **Cell 3** |
| Angle of arrival configuration |  | N/A  Link only, see clause A.3.7A | Setup 1 defined in clause A.3.15.1 | |
| Assumtion for UE beams Note6 |  | Fine | Fine |
| *Noc* Note1 | dBm/15kHz | -112 | -112 |
| *Noc* Note1 | dBm/SCS | -103 | -103 |
| SS-RSRPNote2 | dBm/SCS Note3 | -85 | -85 |
| *Ês/Iot* | dB | 18 | 18 |
| IoNote4 | dBm/95.04 MHz Note4 | -56 | -56 |
| 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 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.7.5.6.4.2.2 Test Requirements

Starting from *onDuration* in time period T1, the UE shall transmit ACK/NACK in response to scheduling in PCell. There shall be no loss of ACK/NACK.

During time period T2, the UE shall transmit ACK/NACKs in response to scheduling in PCell and the rate of missed ACK/NACKs shall be no more than 1.5%.

Starting from *onDuration* in time period T4, the UE shall transmit ACK/NACK in response to scheduling in PCell, SCell1 and SCell2. There shall be no loss of ACK/NACK.

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

End of SIXth Modification

Unchanged Sections Omitted

**< End of change 2>**

**< Start of change 3>**

Start of Change

8.3.5 Direct SCell Activation at Handover

The requirements in this clause apply for UE being configured in the RRC reconfiguration message, TS 38.331 [2], for handover with one SCell for which the parameter *sCellState* is set to *activated*.

The UE shall configure the SCell in activated state upon successful completion of the RRC reconfiguration procedure within the specified delay. Upon receiving the RRC reconfiguration message in slot *n*, the UE shall be capable to transmit valid CSI report and apply actions for the directly activated SCell no later than in slot ,

Where:

Ndirect = TRRC\_process + Tinterrupt + T2 + T3 + Tactivation\_time + TCSI\_Reporting - 3ms for the cases specified in clause 8.3.2 that TCI state is not indicated within Tactivation\_time; otherwise, Ndirect = TRRC\_process + Tinterrupt + T2 + T3 + THARQ +Tactivation\_time + TCSI\_Reporting

TRRC\_Process: RRC procedure delay defined in clause 12 of TS 38.331 [2],

Tinterrupt: Interruption time during handover as specified in clause 6.1.1,

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,

*THARQ* (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3],

If the SCell is configured as deactivated SCell before handover, *TCSI\_Reporting* is specified in clause 8.3.2 and *Tactivation\_time* is defined as:

- TFirstSSB+ 5ms, if the measurement period of the SCell being activated is equal to or smaller than [2400ms].

- TFirstSSB\_MAX + Trs + 5ms, if the measurement period of the SCell being activated is larger than [2400ms].

If the SCell is not configured as deactivated SCell but known and belongs to FR1, *TCSI\_Reporting* is specified in clause 8.3.2 and *Tactivation\_time* is defined as:

- TFirstSSB+ 5ms, if the measurement period of the SCell being activated is equal to or smaller than [2400ms].

- TFirstSSB\_MAX + Trs + 5ms, if measurement period of the SCell being activated is larger than [2400ms].

Otherwise, *Tactivation\_time* and *TCSI\_Reporting* are specified in clause 8.3.2, where the following definitions of *TFirstSSB* and

End of Change

**< End of change 3>**

**< Start of change 4>**

### A.x.x.x Idle Mode measurements of inter-RAT CA candidate cells for early reporting

#### A.x.x.x.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly retains the detected cell status for the idle mode CA measurement when UE transitions from RRC Connected mode to Idle mode, when the UE has entered Idle mode. Additionally, test that the UE performs the required measurements on the serving cell and the configured inter-RAT carrier for idle mode measurement reporting. This test will partly verify the Idle mode CA measurements in clause 4.4. In the test, connected mode DRX configuration is not configured in either PCell or PSCell.

Additionally, the purpose of this test is to verify that the SS-RSRP, SS-RSRQ, RSRP and RSRQ measurement accuracy is within the specified limits. This test will verify the accuracy requirements in Sections 10.1.2B and 10.1.7B for intra-frequency measurements and section 10.2.4 and 10.2.5 for the inter-RAT measurements for the supported test configurations in tables A.x.x.x.x-4 and A.x.x.x.x-5.

The supported test configurations are given in Table A.x.x.x.1-1. The test parameters are given in Tables A.x.x.x.1-2, A.x.x.x.1-3, A.x.x.x.1-4 and A.x.x.x.1-5 below. In the test there are two cells, cell 1, which is the PCell in connected, and serving cell in idle mode, on radio channel 1 in FR1, and cell 2, which is the PSCell in connected, and measured LTE inter-RAT cell in idle mode, on radio channel 2 in LTE.

For the purpose of testing absolute accuracy in idle mode in this set of test cases the cells in idle mode are on different carrier frequencies (NR FR1 and LTE). The absolute accuracy of RSRP and RSRQ inter-RAT measurements are tested by using the parameters in Table A.x.x.x.x-4 and Table A.x.x.x.x-5. In all test cases, Cell 1 is the serving and Cell 2 the target cell.

The test consists of 5 successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. During T1 cell 2, the PSCell, shall be configured.

Time duration T2 starts when UE has transmitted random access preamble on the PSCell. After T2, the UE is configured with idle mode CA measurements with the PSCell carrier as the target carrier. The connection is released [500]ms after T2 when the UE has sent random access preamble on the PSCell.

T3 starts when the connection is released. During the time periods T3 and T4 the UE is in Idle mode with the serving cell on the FR1 carrier. The UE is configured to perform inter-RAT idle mode CA/DC measurements on Cell 2 carrier. After the connection release and during T3, [1000] ms after T3 is started, the signal level of the inter-RAT carrier configured for idle mode CA/DC measurements is changed at which time T4 starts. T5 starts [65]s after T4, when the UE is paged for connection setup and UE is requested by the network to report idle mode CA/DC measurements.

Table A.x.x.x.x-1: Supported test configurations for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

|  |  |
| --- | --- |
| Config | Description |
| 1 | FR1 FDD SSB SCS 15kHz BW 10MHz – LTE FDD 10MHz |
| 2 | FR1 FDD SSB SCS 15kHz BW 10MHz – LTE TDD 10MHz |
| 3 | FR1 TDD SSB SCS 30kHz BW 40MHz – LTE FDD 10MHz |
| 4 | FR1 TDD SSB SCS 30kHz BW 40MHz – LTE TDD 10MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.x.x.x.x.1-2: General test parameters for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | Two radio channels are used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1 in FR1 |
| PSCell |  | Cell 2 | PSCell on RF channel number 2 in LTE |
| DRX |  | OFF | For both PCell and PSCell once configured |
| PRACH configuration in Cell 2 |  | [PRACH\_2CE] | PRACH configuration as specified in Clause A.3.16 in TS 36.133 |
| CSI reporting periodicity and offset configuration for Cell 2 | ms | 2 |  |
| T1 | s | [0.5] | During this time the PCell is known and PSCell is configured. |
| T2 | s | [0.5] | PSCell access. |
| T3 + T4 | s | [66] | During this time the UE is configured to perform inter-frequency measurements in idle mode on the PSCell carrier. |
| T5 | s | [0.5] | UE is paged and connection is setup. Network requests measurement report from the UE. |

Table A.x.x.x.x.1-3: Cell specific test parameters for NR cell for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Config | Test 1 | | | | | | | | | | | |
| Cell 1 | | | | | | | | | | | |
| T1 | T2 | T3 | | | | T4 | | | | | T5 |
| AoA setup | |  | 1,2,3,4 | N/A | | | | | | | | | | | |
| Assumption for UE beams Note 5  R: Rough | |  | 1,2,3,4 | N/A | N/A | R | | | | R | | | | | N/A |
| Frequency Range | |  | 1,2,3,4 | FR1 | | | | | | | | | | | |
| Duplex mode | |  | 1, 2 | FDD | | | | | | | | | | | |
| 3, 4 | TDD | | | | | | | | | | | |
| TDD Confguration  1: TDDConf.1.1  2: TDDConf.2.1 | |  | 1,2 | - | | | | | | | | | | | |
|  | 3,4 | 1 | 1 | 2 | | | | 2 | | | | | 1 |
| BWchannel  1: 10: NRB,c = 52  2: 40: NRB,c = 106 | | MHz | 1, 2 | 1 | 1 | - | | | | - | | | | | 1 |
| 3, 4 | 2 | 2 | - | | | | - | | | | | 2 |
| Initial Downlink BWP configuration | |  | 1,2,3,4 | DLBWP.0.1 | | | | | | | | | | | |
| Initial Uplink BWP configuration | |  | 1,2,3,4 | ULBWP.0.1 | | | | | | | | | | | |
| Dedicated Downlink BWP configuration  1: DLBWP.1.1 | |  | 1,2,3,4 | 1 | 1 | - | | | - | | | | | 1 | |
| Dedicated Uplink BWP configuration  1: ULBWP.1.1 | |  | 1,2,3,4 | 1 | 1 | - | | | - | | | | | 1 | |
| PDSCH Reference Measurement Channel  1: SR.1.1 FDD  2: SR.2.1 TDD | | FDD | 1,2 | 1 | 1 | 1 | | | 1 | | | | | 1 | |
| TDD | 3,4 | 2 | 2 | 2 | | | 2 | | | | | 2 | |
| TRS configuration | |  | 1,2,3,4 | - | | | | | | | | | | | |
| TCI state | |  | 1,2,3,4 | - | | | | | | | | | | | |
| RMSI CORESET parameters | | FDD | 1,2 | CR.1.1 FDD | | | | | | | | | | | |
| TDD | 3,4 | CR.2.1 TDD | | | | | | | | | | | |
| Dedicated CORESET parameters | | FDD | 1,2 | CCR.1.1 FDD | | | | | | | | | | | |
| TDD | 3,4 | CCR.2.1 TDD | | | | | | | | | | | |
| OCNG PatternsNote1 | |  | 1,2,3,4 | OP.1 defined in A.3.2.1 | | | | | | | | | | | |
| SSB configuration  1: SSB.1 FR1  2: SSB.2 FR1 | |  | 1,2 | 1 | | | | | | | | | | | |
|  | 3,4 | 2 | | | | | | | | | | | |
| SMTC configuration | |  | 1,2,3,4 | SMTC.2 | | | | | | | | | | | |
| Correlation Matrix and Antenna config | |  | 1,2,3,4 | 1x2 Low | | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | dB | 1,2,3,4 | 0 | 0 | - | | | - | | | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | 0 | 0 | - | | | - | | | | | 0 | |
| EPRE ratio of PBCH to PBCH DMRS | | 0 | 0 | - | | | - | | | | | 0 | |
| EPRE ratio of PDCCH DMRS to SSS | | 0 | 0 | - | | | - | | | | | 0 | |
| EPRE ratio of PDCCH to PDCCH DMRS | | 0 | 0 | - | | | - | | | | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | | 0 | 0 | - | | | - | | | | | 0 | |
| EPRE ratio of PDSCH to PDSCH | | 0 | 0 | - | | | - | | | | | 0 | |
| EPRE ratio of OCNG DMRS to SSS | | 0 | 0 | - | | | - | | | | | 0 | |
| Noc Note2 | | dBm/ 15kHz | 1,2 | [-98] | [-98] | [-98] | | | [-98] | | | | | [-98] | |
| 3,4 |  | | |  | | | | |
| Noc Note2 | | dBm/SCS | 1,2 | [-98] | [-98] | [-98] | | [ -98] | | | | | [-98] | | |
| 3,4 | [-95] | [-95] | [-95] | | [-95] | | | | | [-95] | | |
|  |  |  |  |  | | | | | | | | | | | |
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|  |
| Ês/Iot | | dB | 1,2,3,4 | [5] | [5] | [5] | | [5] | | | | | [5] | | |
| Ês/Noc | | dB | 1,2,3,4 | [5] | [5] | [5] | | [5] | | | | | [5] | | |
| SS-RSRPNote3,4 | | dBm/SCS | 1,2 | [-93] | [-93] | [-93] | | [-93] | | | | | [-93] | | |
| 3,4 | [-90] | [-90] | [-90] | | [-90] | | | | | [-90] | | |
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| IoNote3,4 | | dBm/ 9.36 MHz | 1,2 | [-63.85] | [-63.85] | -[-63.85] | -[-63.85] | | | | | [-63.85] | | | |
| dBm/ 38.16 MHz | 3,4 | [-57.76] | [-57.76] | -[-57.76] | -[-57.76] | | | | | [-57.76] | | | |
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| Qrxlevmin | | dBm/SCS | 1 | - | - | [-140] | | | | | - | | | | |
|  | 2 | - | - | [-137] | | | | | - | | | | |
|  | 3 | - | - | [TBD] | [TBD] | | | | - | | | | |
|  | 4 | - | - | [TBD] | [TBD] | | | | - | | | | |
| Pcompensation | | dB | 1,2,3,4 | - | - | 0 | 0 | | | | - | | | | |
| Qhysts | | dB | 1,2,3,4 | - | - | 0 | 0 | | | | - | | | | |
| Qoffsets, n | | dB | 1,2,3,4 | - | - | 0 | 0 | | | | - | | | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement | |  | 1,2,3,4 | SS-RSRP | | | | | | | | | | | |
| Treselection | | s | 1,2,3,4 | - | | 0 | | | | | - | | | | |
| SnonintrasearchP | | dB | 1,2,3,4 | - | | [TBD] | | | | | - | | | | |
| SnonintrasearchQ | | dB | 1,2,3,4 | - | | [TBD] | | | | | - | | | | |
| Threshx, high | | dB | 1,2,3,4 | - | | [48] | | | | | - | | | | |
| Threshserving, low | | dB | 1,2,3,4 | - | | [44] | | | | | - | | | | |
| Threshx, low | | dB | 1,2,3,4 | - | | [50] | | | | | - | | | | |
| Propagation Condition | | dB | 1,2,3,4 | - | | AWGN | | | | | - | | | | |

Table A.x.x.x.x.1-4: Cell specific test parameters for LTE cell for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Config | Test 1 | | | | | | | |
| Cell 2 | | | | | | | |
| T1 | T2 | T3 | T4 | | | | T5 |
| Frequency Range | |  | 1,2,3,4 | LTE | | | | | | | |
| Duplex mode | |  | 1, 3 | FDD | | | | | | | |
| 2, 4 | TDD | | | | | | | |
| BWchannel | | MHz | 1,2,3,4 | 10 | 10 | - | - | | | | 10 |
| Measurement bandwidth | |  | 1,2,3,4 | - | - | 22-27 | 22-27 | | | | - |
| PDSCH Reference Measurement Channel  1: R.1 FDD  2: R.1 TDD | | FDD | 1,3 | 1 | 1 | - | - | | | | 1 |
| TDD | 2,4 | 2 | 2 | - | - | | | | 2 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 and A.3.1.2.2 in 36.133  1: R.6 FDD  2: R.6 TDD | |  | 1,3 | 1 | 1 | - | - | | | | 1 |
| 2,4 | 2 | 2 | - | - | | | | 2 |
| OCNG Patterns defined in A.3.2.1.1 (OP.2 FDD) and A.3.2.1.2 (OP.2 TDD) in 36.133  1: OP.2 FDD  2: OP.2 TDD | |  | 1,3 | 1 | | | | | | | |
| 2,4 | 2 | | | | | | | |
| Correlation Matrix and Antenna config | |  | 1,2,3,4 | 1x2 Low | | | | | | | |
| PBCH\_RA | | dB | 1,2,3,4 | N/A | N/A | 0 | 0 | | | | N/A |
| PBCH\_RB | | N/A | N/A | 0 | 0 | | | | N/A |
| PSS\_RA | | N/A | N/A | 0 | 0 | | | | N/A |
| SSS\_RA | | N/A | N/A | 0 | 0 | | | | N/A |
| PCFICH\_RB | | N/A | N/A | 0 | 0 | | | | N/A |
| PHICH\_RA | | N/A | N/A | 0 | 0 | | | | N/A |
| PHICH\_RB | | N/A | N/A | 0 | 0 | | | | N/A |
| PDCCH\_RA | | N/A | N/A | 0 | 0 | | | | N/A |
| PDCCH\_RB | | N/A | N/A | 0 | 0 | | | | N/A |
| PDSCH\_RA | | N/A | N/A | 0 | 0 | | | | N/A |
| PDSCH\_RB | | N/A | N/A | 0 | 0 | | | | N/A |
| OCNG\_RANote 1 | | N/A | N/A | 0 | 0 | | | | N/A |
| OCNG\_RBNote 1 | | N/A | N/A | 0 | 0 | | | | N/A |
| Noc Note2 | | dBm/ 15kHz | 1,2 | [-98] | [-98] | [-98] | [-98] | | | | [-98] |
| 3,4 |  |  | | | |
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| Ês/Iot | | dB | 1,2,3,4 | [5] | [5] | [-3] | [8] | | | | [5] |
| Ês/Noc | | dB | 1,2,3,4 | [5] | [5] | [-3] | [8] | | | | [5] |
| SS-RSRPNote3,4 | | dBm/SCS | 1,2,3,4 | [-93] | [-93] | [-101] | [-90] | | | | [-93] |
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| IoNote3,4 | | dBm/ 9.36 MHz | 1,2, 3, 4 | FFS | FFS | [FFS] | [FFS] | | | | FFS |
|  |  |  |  |  |  | | | |  |
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|  |  |  |  |  | | |  | |
|  |  |  |  |  | | |  | |
| Qrxlevmin | | dBm/SCS | 1 | - | - | [-140] | | | - | | |
|  | 2 | - | - | [-137] | | | - | | |
|  | 3 | - | - | [TBD] | [TBD] | | - | | |
|  | 4 | - | - | [TBD] | [TBD] | | - | | |
| Pcompensation | | dB | 1,2,3,4 | - | - | 0 | 0 | | - | | |
| Qhysts | | dB | 1,2,3,4 | - | - | 0 | 0 | | - | | |
| Qoffsets, n | | dB | 1,2,3,4 | - | - | 0 | 0 | | - | | |
| Cell\_selection\_and\_  reselection\_quality\_measurement | |  | 1,2,3,4 | RSRP and RSRQ | | | | | | | |
| Treselection | | s | 1,2,3,4 | - | | 0 | | - | | | |
| SnonintrasearchP | | dB | 1,2,3,4 | - | | [TBD] | | - | | | |
| SnonintrasearchQ | | dB | 1,2,3,4 | - | | [TBD] | | - | | | |
| Threshx, high | | dB | 1,2,3,4 | - | | [48] | | - | | | |
| Threshserving, low | | dB | 1,2,3,4 | - | | [44] | | - | | | |
| Threshx, low | | dB | 1,2,3,4 | - | | [50] | | - | | | |
| Propagation Condition | | dB | 1,2,3,4 | - | | AWGN | | - | | | |

Table A.x.x.x.x.x-5: General idle mode test parameters for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Serving cell |  | 1, 2, 3, 4 | Cell1 | The UE camps on cell 1 which is the former PCell. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell2 | The UE shall perform inter-frequency measurements on cell 2 which is the former PSCell. |
| RF Channel Number |  | 1, 2, 3, 4 | 1, 2 |  |
| Time offset between cells |  | 1, 2, 3, 4 | 3 μs | Synchronous cells |
| Access Barring Information | - | 1, 2, 3,4 | Not Sent | No additional delays in random access procedure. |
| SSB configuration |  | 1, 2 | SSB.1 FR1 | Serving cell |
| 3, 4 | SSB.2 FR1 | Serving cell |
| SMTC configuration Serving cell |  | 1, 2, 3, 4 | SMTC.2 |  |
| DRX cycle length | s | 1, 2, 3, 4 | 1.28 | The value shall be used for all cells in the test. |
| PRACH configuration index |  | 1, 2, 3, 4 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell |  | 1, 2, 3, 4 | Not configured |  |
| T3 | s | 1, 2, 3, 4 | [0.5] | T3 needs to be defined so that cell measurement time is taken into account. |
| T4 | s | 1, 2, 3, 4 | [65] | T4 needs to be defined so that cell measurement time is taken into account. |

#### A.x.x.x.2 Test Requirements

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

During time durations T1 the UE shall start transmitting preamble on PSCell. During T2 the UE perform intra-frequency measurements on the PCell and the PSCell.

During the time-period T3 the connection is released, and UE enters idle mode. During the time period T3 and T4 the UE is camped in Idle mode and at T4 the signal level of cell 2 is changed. The UE shall not perform reselection. The UE shall perform Idle Mode CA measurement according to Section 4.4.

At the start of T5 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report. The UE shall send early measurement report to the PCell including idle mode CA/DC measurement from cell 2.

After receiving the requested early measurement report, the test equipment verifies that the accuracy of measurement reported for serving Cell 1 and Cell 2 meets the requirements in Sections 10.1.2B and 10.1.7B and Sections 10.2.4 and 10.2.5, respectively and test ends.

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

**< End of change 4>**

**< Start of change 5>**

A.4.6.7.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR when DRX is not used

A.4.6.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement based on CSI-RS CMR without dedicated IMR. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.1, with the testing configurations for NR cells in Table A.4.6.7.1.1-1.

Table A.4.6.7.1.1-1: Applicable NR configurations for FR1 CSI-RS based L1-SINR test

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

A.4.6.7.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.7.1.2-1 and Table A.4.6.7.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-SINR on aperiodic CSI-RS resources. After 80ms from the beginning of the test, the DCI trigger comes in slot n (1 Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.7.1.2-1.

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

Table A.4.6.7.1.2-1: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Config | Unit | Value |
| SSB GSCN | 1~6 |  | freq1 |
| Duplex mode | 1,4 |  | FDD |
| 2,5 | TDD |
| 3,6 | TDD |
| TDD Configuration | 1,4 |  | N/A |
| 2,5 | TDDConf.1.1 |
| 3,6 | TDDConf.2.1 |
| BWchannel | 1,4 | MHz | 10: NRB,c = 52 |
| 2,5 | 10: NRB,c = 52 |
| 3,6 | 40: NRB,c = 106 |
| PDSCH Reference measurement channel | 1,4 |  | SR.1.1 FDD |
| 2,5 | SR.1.1 TDD |
| 3,6 | SR.2.1 TDD |
| RMSI CORESET Reference Channel | 1,4 |  | CR.1.1 FDD |
| 2,5 | CR.1.1 TDD |
| 3,6 | CR.2.1 TDD |
| Dedicated CORESET Reference Channel | 1,4 |  | CCR.1.1 FDD |
| 2,5 | CCR.1.1 TDD |
| 3,6 | CCR.2.1 TDD |
| SSB configuration | 1,4 |  | SSB.3 FR1 |
| 2,5 | SSB.3 FR1 |
| 3,6 | SSB.4 FR1 |
| CSI-RS configuration | 1,4 |  | CSI-RS.1.3 FDD |
| 2,5 | CSI-RS.1.3 TDD |
| 3,6 | CSI-RS.2.3 TDD |
| OCNG Patterns | 1~6 |  | OP.1 |
| TRS Configuration | 1,4 |  | TRS.1.1 FDD |
| 2,5 |  | TRS.1.1 TDD |
| 3,6 |  | TRS.1.2 TDD |
| Initial BWP Configuration | 1~6 |  | DLBWP.0.1  ULBWP.0.1 |
| Dedicated BWP configuration | 1~6 |  | DLBWP.1.1  ULBWP.1.1 |
| SMTC configuration | 1~6 |  | SMTC.1 |
| DRX configuration | 1~6 |  | Off |
| reportConfigType | 1~6 |  | aperiodic |
| reportQuantity-r16 | 1~6 |  | cri-SINR-r16 |
| Number of reported RS | 1~6 |  | 2 |
| qcl-Info | 1~6 |  | SSB#0 for resource#0 |
| SSB#1 for resource#1 |
| reportSlotOffsetList | 1~6 | slots | 26 |
| T1 | 1~6 | s | 5 |
| EPRE ratio of PSS to SSS | 1~6 | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation condition | 1~6 |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

Table A.4.6.7.1.2-2: CSI-RS specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Config | Unit | CSI-RS#0 | CSI-RS#1 |
| Note1 | 1~6 | dBm/15kHz | -94.65 | |
| Note1 | 1,2,4,5 | dBm/SSB SCS | -94.65 | |
| 3,6 | -91.65 | |
|  | 1~6 | dB | 0 | 3 |
| CSI-RS RSRP Note3 | 1,2,4,5 | dBm/SSB SCS | -94.65 | -91.65 |
| 3,6 | -91.65 | -88.65 |
| Io Note2 | 1,2,4,5 | dBm/9.36 MHz | -63.69 | -61.93 |
| 3,6 | dBm/38.16 MHz | -57.59 | -55.84 |
|  | 1~6 | dB | 0 | 3 |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

**< End of change 5>**

**< Start of change 6>**

### 9.2.5.2 Measurement period

The measurement period for intrafrequency measurements without gaps is as shown in table 9.2.5.2-1, 9.2.5.2-2, 9.2.5.2-3 (deactivated SCell) or 9.2.5.2-4(deactivated SCell). When *highSpeedMeasFlag-r16* is configured, T SSB\_measurement\_period\_intra is specified in Table 9.2.5.2-5.

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 TSSB\_measurement\_period\_intra

If SCG DRX is in use, intrafrequency measurement period requirements specified in Table 9.2.5.2-1, Table 9.2.5.2-2, Table 9.2.5.2-3 and Table 9.2.5.2-4 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

For FR2, a longer measurement period is allowed, if aperiodic CSI-RS resource is measured for L1-RSRP measurement on any FR2 serving frequency in the same band, and the CSI-RS resource is outside measurement gap and 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. If *SSB-ToMeasure* or *SS-RSSI-Measurement* is configured, the SSB symbols are indicated by the union set of *SSB-ToMeasure* from all the configured measurement objects on the same band which can be merged and the RSSI symbols are indicated by *SS-RSSI-Measurement*.

Table 9.2.5.2-1: Measurement period for intra-frequency measurements without gaps(FR1)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_intra |
| No DRX | max(200ms, ceil( 5 x Kp) x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5x 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 | |

Table 9.2.5.2-2: Measurement period for intra-frequency measurements without gaps(FR2)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_intra |
| No DRX | max(400ms, ceil(Mmeas\_period\_w/o\_gaps x Kp x Klayer1\_measurement) x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(400ms, ceil(1.5x Mmeas\_period\_w/o\_gaps x Kp x Klayer1\_measurement) x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil(Mmeas\_period\_w/o\_gaps xKp 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 | |

Table 9.2.5.2-3: Measurement period for intra-frequency measurements without gaps (deactivated SCell) (FR1)

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_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 |

**Table 9.2.5.2-4: Measurement period for intra-frequency measurements without gaps (deactivated SCell) (FR2)**

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_intra |
| No DRX | Ceil(Mmeas\_period\_w/o\_gaps x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 320ms | Ceil(Mmeas\_period\_w/o\_gaps x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(Mmeas\_period\_w/o\_gaps x Kp) x max(measCycleSCell, DRX cycle) x CSSFintra |

Table 9.2.5.2-5: T SSB\_measurement\_period\_intra When *highSpeedMeasFlag-r16* is configured (Frequency range FR1

|  |  |
| --- | --- |
| DRX cycle | T SSB\_measurement\_period\_intra |
| No DRX Note 2 | max(200ms, ceil( 5 x Kp) x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 160ms | max(200ms, ceil(5 x M2 Note 2 x Kp) x max(SMTC period,DRX cycle)) x CSSFintra |
| 160ms < DRX cycle≤ 320ms | ceil(4 x M2 Note 2 x Kp) x DRX cyclex CSSFintra |
| DRX cycle>320ms | ceil( Y Note 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: 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  NOTE 4: When *highSpeedMeasFlag-r16* is configured, the requirements apply only to UE supporting either *measurementEnhancement-r16* or *[intraRAT-MeasurementEnhancement-r16]* on measurements of the primary component carrier and do not apply to measurements of a secondary component carrier with active SCell. | |

**< End of change 6>**

**< Start of change 7>**

A.6.1.2.5 Cell reselection to lower priority E-UTRAN cell for UE configured with highSpeedMeasFlag-r16

A.6.1.2.5.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements for UE configured with *highSpeedMeasFlag-r16* specified in clause 4.2.2.5 when the E-UTRAN cell is of lower priority.

A.6.1.2.5.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.5.2-1, A.6.1.2.5.2-2, A.6.1.2.5.2-3 and A.6.1.2.5.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1. The E-UTRAN cell 2 is indicated by NR cell 1 as an HST cell.

**Table A.6.1.2.5.2-1: Supported test configurations**

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

**Table A.6.1.2.5.2-2: General test parameters for NR to E-UTRAN cell re-selection test case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Value** | **Comment** |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell1 | The UE camps on cell 1 in the initial phase. |
| T1 end condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell2 | The UE shall perform reselection to cell 2 during T1. |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6 | Cell1 |
| T2 end condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell1 | The UE shall perform reselection to cell 1 during T2 for iteration of the tests. |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6 | Cell2 |
| Access Barring Information | | - | 1, 2, 3, 4, 5, 6 | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1, 2, 3, 4, 5, 6 | 0.32 | The value shall be used for all cells in the test. |
| NR PRACH configuration index | |  | 1, 2, 3, 4, 5, 6 | 77 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index | |  | 1, 2, 3, 4, 5, 6 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
| T1 | | s | 1, 2, 3, 4, 5, 6 | 15 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 1, 2, 3, 4, 5, 6 | 75 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

**Table A.6.1.2.5.2-3: Cell specific test parameters for NR cell 1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | |
| **T1** | **T2** |
| TDD configuration |  | 1, 4 | N/A | |
|  |  | 2, 5 | TDDConf.1.1 | |
|  |  | 3, 6 | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | |
|  |  | 2, 5 | SR.1.1 TDD | |
|  |  | 3, 6 | SR.2.1 TDD | |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | |
|  |  | 2, 5 | CR.1.1 TDD | |
|  |  | 3, 6 | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | |
|  |  | 2, 5 | CCR.1.1 TDD | |
|  |  | 3, 6 | CCR.2.1 TDD | |
| SSB configuration |  | 1, 4 | SSB.1 FR1 | |
|  |  | 2, 5 | SSB.1 FR1 | |
|  |  | 3, 6 | SSB.2 FR1 | |
| SMTC configuration |  | 1, 4 | SMTC pattern 2 | |
|  |  | 2, 5 | SMTC pattern 1 | |
|  |  | 3, 6 | SMTC pattern 1 | |
| OCNG Pattern |  | 1, 2, 3, 4, 5, 6 | OP.1 defined in A.3.2.1 | |
| Initial DL BWP configuration |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | |
| Initial UL BWP configuration |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | |
| RLM-RS |  | 1, 2, 3, 4, 5, 6 | SSB | |
| Qrxlevmin | dBm/SCS | 1, 2, 4, 5 | -140 | |
|  |  | 3, 6 | -137 | |
|  | dBm/SCS | 1, 4 | -98 | |
|  |  | 2, 5 | -98 | |
|  |  | 3, 6 | -95 | |
|  | dBm/15 kHz | 1, 2, 3, 4, 5, 6 | -98 | |
| SS-RSRP | dBm/SCS | 1, 4 | -102 | -86 |
|  |  | 2, 5 | -102 | -86 |
|  |  | 3, 6 | -99 | -83 |
|  | dB | 1, 4 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
|  | dB | 1, 4 | -4 | 12 |
|  |  | 2, 5 |  |  |
|  |  | 3, 6 |  |  |
| Io | dBm/9.36 MHz | 1, 4 | -68.60 | -57.78 |
|  | dBm/9.36 MHz | 2, 5 | -68.60 | -57.78 |
|  | dBm/38.16 MHz | 3, 6 | -62.50 | -51.69 |
| Treselection | S | 1, 2, 3, 4, 5, 6 | 0 | |
| SnonintrasearchP | dB | 1, 2, 3, 4, 5, 6 | 50 | |
| Threshx, highP (Note 2) | dB | 1, 2, 3, 4, 5, 6 | 48 | |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6 | 44 | |
| Threshx, lowP | dB | 1, 2, 3, 4, 5, 6 | 50 | |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN 1944HzNote3 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, highP** which is included in NR system information, and is a threshold for the E-UTRA target cell.  Note 3: The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944 Hz. | | | | |

**Table A.6.1.2.5.2-4: Cell specific test parameters for E-UTRA cell 2**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| E-UTRA RF Channel number |  | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Patterns defined in TS 36.133 [15] clause A.3.2 |  | OP.2 TDD for test configuration 1, 2, 3;  OP.2 FDD for test configuration 4, 5, 6 | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| PCFICH\_RB | dB |  | |
| PHICH\_RA | dB |  | |
| PHICH\_RB | dB |  | |
| PDCCH\_RA | dB |  | |
| PDCCH\_RB | dB |  | |
| PDSCH\_RA | dB |  | |
| PDSCH\_RB | dB |  | |
| OCNG\_RANote 1 | dB |  | |
| OCNG\_RBNote 1 | dB |  | |
| Qrxlevmin | dBm | -140 | |
|  | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -84 | -84 |
|  | dB | 14 | 14 |
|  | dB | 14 | 14 |
| TreselectionEUTRAN | S | 0 | |
| SnonintrasearchP | dB | Not sent | |
| Threshx, highP (Note 2) | dB | 48 | |
| Threshserving, lowP | dB | 44 | |
| Threshx, lowP | dB | 50 | |
| Propagation Condition |  | AWGN 1944Hz | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: This refers to the value of Thresh**x, highP** which is included in E-UTRA system information, and is a threshold for the NR target cell | | | |

A.6.1.2.5.3 Test Requirements

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

The cell re-selection delay to a lower priority cell shall be less than 3 s.

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

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

Where:

Tevaluate, E-UTRAN\_HST See Table 4.2.2.5-2 in clause 4.2.2.5

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

This gives a total of 2.24 s, allow 3 s for the cell re-selection delay to a lower priority E-UTRAN cell.

**< End of change 7>**

**< Start of change 8>**

### 8.3.7 SCell Activation Delay Requirement for Deactivated SCell with Multiple Downlink SCells

The requirements in this clause shall apply for the UE configured with more than one SCells.

In EN-DC, NE-DC, standalone NR, or in one CG of NR-DC, the requirements in this clause shall apply when the following conditions are met:

- UE only receives one single MAC command for multiple SCell activation within the activation period defined in this clause

- in each single CG, there are no other SCell activation, deactivation, addition or release before activation is completed for all the SCells activated by the single MAC CE in this clause, and

- in EN-DC and NE-DC, there are no E-UTRAN SCell activation, deactivation, addition or release before multiple SCell activation is completed in this clause, and

- any to-be-activated unknown SCell has active serving cell(s) or known to-be-activated SCell(s) on the same band

In two CGs of NR-DC, the requirements in this clause shall apply when the following conditions are met:

- UE receives one MAC command per CG for multiple SCell activation within the activation period defined in this clause, and

- UE supports per-FR measurement gap capability, and

- any to-be-activated unknown SCell has active serving cell(s) or known to-be-activated SCell(s) on the same band

The delay within which the UE shall be able to activate the deactivated SCell with other downlink to-be-activated SCell(s) depends upon the specified conditions.

Upon receiving SCell activation command in slot *n* for more than one SCell, for each of the to-be-activated SCell, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command for the SCell being activated no later than in slot , where:

THARQ (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]

Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario.

If the SCell is known and belongs to FR1 and the SCell measurement cycle is equal to or smaller than 160ms, Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 known Scell with the SCell measurement cycle larger than 160ms but does not have any parallel to-be-activated SCell which is FR1 unknown SCell.

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 unknown Scell

- otherwise, TFirstSSB\_MAX\_multiple\_scells + 5ms.

If the SCell is known and belongs to FR1 and the SCell measurement cycle is larger than 160ms, Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 unknown Scell

- otherwise, TFirstSSB\_MAX\_multiple\_scells + Trs + 5ms

If the SCell is unknown and belongs to FR1, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+Trs +5ms, if the SCell is not counted in N1

- The activation delay may be longer if SSB is not in the same half-frame on the SCell and the contiguous FR1 known cell or contiguous FR1 active serving cell

- otherwise, TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+Trs\*N1 +Trs +5ms

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, if the UE is not provided with any SMTC for the target SCell, Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2

If the SCell being activated belongs to FR2 and if there is no active serving cell on that FR2 band provided that PCell or PSCell is FR1:

If the target SCell is known to UE and semi-persistent CSI-RS is used for CSI reporting, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the target SCell is unknown to UE and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time\_multiple\_scells is:

- 3 ms + max(Tuncertainty\_MAC\_multiple\_scells +TFineTiming + 2ms, Tuncertainty\_SP\_multiple\_scells), if on the same band UE also has at least one parallel to-be-activated SCell which is FR2 known Scell. Tuncertainty\_MAC\_multiple\_scells =0 and Tuncertainty\_SP\_multiple\_scells =0 if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation commands at the same time.

If the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time\_multiple\_scells is:

- max(Tuncertainty\_MAC\_multiple\_scells + 5ms + TFineTiming, Tuncertainty\_RRC\_multiple\_scells + TRRC\_delay-THARQ), if on the same band UE also has at least one parallel to-be-activated SCell which is FR2 known Scell . Tuncertainty\_MAC\_multiple\_scells =0 if UE receives the SCell activation command and TCI state activation commands at the same time.

The requirements for FR2 unknown SCells apply provided that the parameter *ssb-PositionsInBurst* is same for the SCell and the known serving cell on the same FR2 band. The activation delay FR2 unknown SCell may be longer if SSB is not in the same half-frame on the SCell and the contiguous FR2 known cell.

Where,

N1 is the number counting for parallel FR1 unknown to-be-activated SCell(s) only except the ones which fulfilled the following conditions:

- contiguous to an active serving cell in the same band, or to a known SCell in the same band being activated by the same MAC PDU, and

- A single SSB is used in the unknown SCell; or multiple SSBs are used in the unknown SCell and TCI state indication for PDCCH is provided by the same MAC PDU used for SCell activation; and

- its *ssb-PositionInBurst* is same as the one of contiguous FR1 known cell or contiguous FR1 active serving cell, and

- its RTD with contiguous FR1 known cell or contiguous FR1 active serving cell is smaller than or equal to 260ns with respect to the to-be-activated SCell’s SSB numerology and its reception power difference with contiguous FR1 known cell or contiguous FR1 active serving cell is smaller than or equal to 6dB, and

- its SMTC offset is same as the one of contiguous FR1 known cell or contiguous FR1 active serving cell

However, when the following conditions are fulfilled, no activation requirement will be applied for this unknown SCell and other SCells being activated and counted in N1:

- contiguous to an active serving cell in the same band, or to a known SCell in the same band being activated by the same MAC PDU, and

- A single SSB is used in the unknown SCell; or multiple SSBs are used in the unknown SCell and TCI state indication for PDCCH is provided by the same MAC PDU used for SCell activation; and

- its *ssb-PositionInBurst* is same as the one of FR1 known cell or FR1 active serving cell, and

- its RTD with contiguous FR1 known cell or contiguous FR1 active serving cell is larger than 260ns with respect to the to-be-activated SCell’s SSB numerology or its reception power difference with contiguous FR1 known cell or contiguous FR1 active serving cell is larger than 6dB, and

- its SMTC offset is same as the one of FR1 known cell or FR1 active serving cell

TSMTC\_MAX\_multiple\_scells:

- In FR1, in case of intra-band SCell activation, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity between active serving cells and SCells being activated on the same band provided the cell specific reference signals from the active serving cells and the SCells being activated or released are available in the same slot; in case of inter-band SCell activation, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity of SCells being activated on the same band.

- In FR2, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity between active serving cells and SCell(s) being activated in FR2 intra-band CA.

- TSMTC\_MAX\_multiple\_scells is bounded to a minimum value of 10ms.

TFirstSSB\_MAX\_multiple\_scells: is the time to the end of the first complete SSB burst indicated by the SMTC after slot n + , further fulfilling:

- In FR1, in case of intra-band SCell activation, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot; in case of inter-band SCell activation, the first occasion when the SCells being activated are transmitting SSB burst.

- In FR2, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot.

Tuncertainty\_MAC\_multiple\_scells is the time period between reception of the activation command for PDCCH TCI, PDSCH TCI (when applicable) and SCell activation command of this unknown SCell.

Tuncertainty\_SP\_multiple\_scells is the time period between reception of the activation command for semi-persistent CSI-RS resource set for CQI reporting and SCell activation command of this unknown SCell.

Tuncertainty\_RRC\_multiple\_scells is the time period between reception of the RRC configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) and SCell activation command of this unknown SCell.

Trs, TFineTiming, and TRRC\_delay is defined in clause 8.3.2.

Longer delays for RRM measurement requirements, and in case of FR2 also SSB based RLM/BFD/CBD/L1-RSRP measurement requirements, can be expected during the cell detection time for unknown SCell activation.

The condition of known SCell in FR1 or FR2 is defined in clause 8.3.2.

If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2*prior to the activation command, TSMTC\_Scell follows *smtc1* or *smtc2* according to the physical cell ID of the target cell being activated. TSMTC\_MAX\_multiple\_scell follows *smtc1* or *smtc2* according to the physical cell IDs of the target cells being activated and the active serving cells.

The starting point and the end-point of an interruption window on PCell or any activated SCell in MCG for NR standalone mode, or on PSCell or any activated SCell in SCG for EN-DC mode is same as single SCell activation requirement in clause 8.3.2.

Upon receiving SCell activation command in slot *n,* if the start of the first complete SSB used in the *TX* in the different bands which have SCells being activated after *n*+ are not aligned on time domain among

- SCells in different bands being activated by the same MAC CE if UE does not support per FR gap, or

- SCells in different FR1 bands being activated by the same MAC CE if UE supports per FR gap,

additional interruptions may be expected for the activated serving cells, where

- The number of additional interruptions is no more than the number of FR1 bands which have both SCell being activated for which the activation requirements involves *TFirstSSB\_MAX* *multiple\_scells* with *Trs* and the active serving cell, and

- In each interruption occasion, the interruption length is defined in clause 8.2.2.2.2, and

- Longer activation delay may be expected for multiple SCell activation under one MAC CE with multiple interruptions, and

- *TX* is:

- *TFirstSSB*, for any scenario where *Tactivation\_time* *multiple\_scells*includes *TFirstSSB*;

- *TFirstSSB\_MAX* *multiple\_scells*, for any scenario where *Tactivation\_time* *multiple\_scells*includes *TFirstSSB\_MAX* *multiple\_scells*;

- *Tuncertainty\_MAC+TFineTiming* or *Tuncertainty\_MAC* *multiple\_scells+TFineTiming*, for any scenario where *Tactivation\_time* *multiple\_scells*includes *TFineTiming*.

Otherwise, no additional interruption is expected due to activation of multiple SCells.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed a first L1-RSRP measurement, the UE shall report lowest valid L1 SS-RSRP range if the UE has available uplink resources to report L1-RSRP for the SCell.

**< End of change 8>**

**< Start of change 9>**

Modification 1

##### 8.2.1.2.13 Interruptions at E-UTRA SRS carrier based switching

A PUSCH-less carrier of E-UTRA SCell is a TDD carrier without PUCCH/PUSCH configured. When a UE needs to transmit periodic or aperiodic SRS [23] and/or non-contention based PRACH on a PUSCH-less carrier of E-UTRA SCell, the UE can perform carrier based switching to one or more PUSCH-less carrier of E-UTRA SCells from a E-UTRA carrier with PUSCH or from another PUSCH-less E-UTRA carrier of SCell prior to transmitting SRS and/or PRACH, provided that:

- switching is from a configured E-UTRA carrier to another activated TDD E-UTRA carrier;

- the PUSCH-less carrier of E-UTRA SCells to which SRS carrier based switching is performed is indicated by DCI SRS request field for aperiodic SRS transmission or configured via RRC [15] for periodic SRS transmission;

- the E-UTRA serving cell, from which SRS carrier based switching is performed and whose UL transmission may therefore be interrupted, is indicated by srs-SwitchFromServCellIndex [15];

- the SRS switching is not colliding with any other transmission with higher priority defined in TS36.213 [26];

- the SRS switching is not colliding with PDCCH in subframe 0 and 5 as specified in TS36.213 [26];

- for UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and is compliant to the requirements for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx specified in TS 36.101 [25], the SRS or RACH transmission are not simultaneously scheduled with DL subframe #0 or DL subframe #5 on other E-UTRA carriers.

The UE shall not perform SRS carrier based switching if the above conditions cannot be met.

When SRS carrier based switching is performed between E-UTRA carriers, the UE is allowed interruptions on any active serving cell in SCG if UE is not capable of Per-FR gap, or on active serving cell(s) in SCG in FR1 if UE is capable of Per-FR gap, during the switching to the PUSCH-less carrier of a serving cell,

- with up to X3 slot as specified in Table 8.2.1.2.13-1.

When SRS carrier based switching is performed between E-UTRA carriers, the UE is allowed interruptions on any active serving cell in SCG if UE is not capable of Per-FR gap, or on active serving cell(s) in SCG in FR1 if UE is capable of Per-FR gap, during the switching from the PUSCH-less carrier of a serving cell,

- with up to X3 slot as specified in Table 8.2.1.2.13-1

Table 8.2.1.2.13-1: Interruption length X3 (slot)

|  |  |  |
| --- | --- | --- |
|  | NR Slot | Interruption length X3 |
|  | length (ms) | (slots) |
| 0 | 1 | 2 |
| 1 | 0.5 | 3 |
| 2 | 0.25 | 5 |
| 3 | 0.125 | 9 |

End of Modification 1

Unchanged Sections Omitted

Modification 2

##### 8.2.3.2.12 Interruptions at E-UTRA SRS carrier based switching

A PUSCH-less carrier of E-UTRA SCell is a TDD carrier without PUCCH/PUSCH configured. When a UE needs to transmit periodic or aperiodic SRS [23] and/or non-contention based PRACH on a PUSCH-less E-UTRA carrier of SCell, the UE can perform carrier based switching to one or more PUSCH-less carrier of E-UTRA SCells from a E-UTRA carrier with PUSCH or from another PUSCH-less E-UTRA carrier of SCell prior to transmitting SRS and/or PRACH, provided that:

- switching is from a configured E-UTRA carrier to another activated TDD carrier;

- the PUSCH-less carrier of E-UTRA SCells to which SRS carrier based switching is performed is indicated by DCI SRS request field for aperiodic SRS transmission or configured via RRC [15] for periodic SRS transmission;

- the E-UTRA serving cell, from which SRS carrier based switching is performed and whose UL transmission may therefore be interrupted, is indicated by srs-SwitchFromServCellIndex [15];

- the SRS switching is not colliding with any other transmission with higher priority defined in TS36.213 [TBD];

- the SRS switching is not colliding with PDCCH in subframe 0 and 5 as specified in TS36.213 [TBD];

- for UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and is compliant to the requirements for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx specified in TS 36.101 [25], the SRS or RACH transmission are not simultaneously scheduled with DL subframe #0 or DL subframe #5 on other E-UTRA carriers.

The UE shall not perform SRS carrier based switching if the above conditions cannot be met.

When SRS carrier based switching is performed between E-UTRA carriers, the UE is allowed interruptions on any active serving cell in MCG if UE is not capable of Per-FR gap, or on active serving cell(s) in MCG in FR1 if UE is capable of Per-FR gap, during the switching to the PUSCH-less carrier of a serving cell,

- with up to X2 slot as specified in Table 8.2.3.2.12-1.

When SRS carrier based switching is performed between E-UTRA carriers, the UE is allowed interruptions on any active serving cell in MCG if UE is not capable of Per-FR gap, or on active serving cell(s) in MCG in FR1 if UE is capable of Per-FR gap, during the switching from the PUSCH-less carrier of a serving cell,

- with up to X2 slot as specified in Table 8.2.3.2.12-1

Table 8.2.3.2.12-1: Interruption length X2 (slot)

|  |  |  |
| --- | --- | --- |
|  | NR Slot | Interruption length X2 |
|  | length (ms) | (slots) |
| 0 | 1 | 2 |
| 1 | 0.5 | 3 |
| 2 | 0.25 | 5 |
| 3 | 0.125 | 9 |

End of Modification 2

**< End of change 9>**

**< Start of change 10>**

8.3.7 SCell Activation Delay Requirement for Deactivated SCell with Multiple Downlink SCells

The requirements in this clause shall apply for the UE configured with more than one SCells.

In EN-DC, NE-DC, standalone NR, or in one CG of NR-DC, the requirements in this clause shall apply when the following conditions are met:

- UE only receives one single MAC command for multiple SCell activation within the activation period defined in this clause

- in each single CG, there are no other SCell activation, deactivation, addition or release before activation is completed for all the SCells activated by the single MAC CE in this clause, and

- in EN-DC and NE-DC, there are no E-UTRAN SCell activation, deactivation, addition or release before multiple SCell activation is completed in this clause, and

- any to-be-activated unknown SCell has active serving cell(s) or known to-be-activated SCell(s) on the same band

In two CGs of NR-DC, the requirements in this clause shall apply when the following conditions are met:

- UE receives one MAC command per CG for multiple SCell activation within the activation period defined in this clause, and

- UE supports per-FR measurement gap capability, and

- any to-be-activated unknown SCell has active serving cell(s) or known to-be-activated SCell(s) on the same band

The delay within which the UE shall be able to activate the deactivated SCell with other downlink to-be-activated SCell(s) depends upon the specified conditions.

Upon receiving SCell activation command in slot *n* for more than one SCell, for each of the to-be-activated SCell, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command for the SCell being activated no later than in slot , where:

THARQ (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]

Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario.

If the SCell is known and belongs to FR1 and the SCell measurement cycle is equal to or smaller than 160ms, Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 known Scell with the SCell measurement cycle larger than 160ms but does not have any parallel to-be-activated SCell which is FR1 unknown SCell.

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 unknown Scell

- otherwise, TFirstSSB\_MAX\_multiple\_scells + 5ms.

If the SCell is known and belongs to FR1 and the SCell measurement cycle is larger than 160ms, Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 unknown Scell

- otherwise, TFirstSSB\_MAX\_multiple\_scells + Trs + 5ms

If the SCell is unknown and belongs to FR1, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+Trs +5ms, if the SCell is not counted in N1

- The activation delay may be longer if SSB is not in the same half-frame on the SCell and the contiguous FR1 known cell or contiguous FR1 active serving cell

otherwise

- if the following conditions are met

- ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or

- ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation,

Tactivation\_time\_multiple\_scells is:

- 6ms + TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs\*N1 + TL1-RSRP,measure + TL1-RSRP,report + THARQ + max(Tuncertainty\_MAC\_multiple\_scells + TFineTiming + 2ms, Tuncertainty\_SP\_multiple\_scells), if semi-persistent CSI-RS is used for CSI reporting,

- 3ms + TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs\*N1 + TL1-RSRP,measure + TL1-RSRP,report + max(THARQ + Tuncertainty\_MAC\_multiple\_scells + 5ms + TFineTiming, Tuncertainty\_RRC\_multiple\_scells + TRRC\_delay), if periodic CSI-RS is used for CSI reporting.

- otherwise, TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+Trs\*N1 +Trs +5ms

If the SCell being activated belongs to FR1 and if there is at least one active serving cell contiguous to the SCell on that FR1 band, if the UE is not provided with SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration for the target SCell, Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, if the UE is not provided with any SMTC for the target SCell, Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2

If the SCell being activated belongs to FR2 and if there is no active serving cell on that FR2 band provided that PCell or PSCell is FR1:

If the target SCell is known to UE and semi-persistent CSI-RS is used for CSI reporting, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the target SCell is unknown to UE and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time\_multiple\_scells is:

- 3 ms + max(Tuncertainty\_MAC\_multiple\_scells +TFineTiming + 2ms, Tuncertainty\_SP\_multiple\_scells), if on the same band UE also has at least one parallel to-be-activated SCell which is FR2 known Scell. Tuncertainty\_MAC\_multiple\_scells =0 and Tuncertainty\_SP\_multiple\_scells =0 if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation commands at the same time.

If the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time\_multiple\_scells is:

- max(Tuncertainty\_MAC\_multiple\_scells + 5ms + TFineTiming, Tuncertainty\_RRC\_multiple\_scells + TRRC\_delay-THARQ), if on the same band UE also has at least one parallel to-be-activated SCell which is FR2 known Scell . Tuncertainty\_MAC\_multiple\_scells =0 if UE receives the SCell activation command and TCI state activation commands at the same time.

The requirements for FR2 unknown SCells apply provided that the parameter *ssb-PositionsInBurst* is same for the SCell and the known serving cell on the same FR2 band. The activation delay FR2 unknown SCell may be longer if SSB is not in the same half-frame on the SCell and the contiguous FR2 known cell.

Where,

N1 is the number counting for parallel FR1 unknown to-be-activated SCell(s) only except the ones which fulfilled the following conditions:

- contiguous to an active serving cell in the same band, or to a known SCell in the same band being activated by the same MAC PDU, and

- A single SSB is used in the unknown SCell; or multiple SSBs are used in the unknown SCell and TCI state indication for PDCCH is provided by the same MAC PDU used for SCell activation; and

- its *ssb-PositionInBurst* is same as the one of contiguous FR1 known cell or contiguous FR1 active serving cell, and

- its RTD with contiguous FR1 known cell or contiguous FR1 active serving cell is smaller than or equal to 260ns with respect to the to-be-activated SCell’s SSB numerology and its reception power difference with contiguous FR1 known cell or contiguous FR1 active serving cell is smaller than or equal to 6dB, and

- its SMTC offset is same as the one of contiguous FR1 known cell or contiguous FR1 active serving cell

However, when the following conditions are fulfilled, no activation requirement will be applied for this unknown SCell and other SCells being activated and counted in N1:

- contiguous to an active serving cell in the same band, or to a known SCell in the same band being activated by the same MAC PDU, and

- A single SSB is used in the unknown SCell; or multiple SSBs are used in the unknown SCell and TCI state indication for PDCCH is provided by the same MAC PDU used for SCell activation; and

- its *ssb-PositionInBurst* is same as the one of FR1 known cell or FR1 active serving cell, and

- its RTD with contiguous FR1 known cell or contiguous FR1 active serving cell is larger than 260ns with respect to the to-be-activated SCell’s SSB numerology or its reception power difference with contiguous FR1 known cell or contiguous FR1 active serving cell is larger than 6dB, and

- its SMTC offset is same as the one of FR1 known cell or FR1 active serving cell

TSMTC\_MAX\_multiple\_scells:

- In FR1, in case of intra-band SCell activation, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity between active serving cells and SCells being activated on the same band provided the cell specific reference signals from the active serving cells and the SCells being activated or released are available in the same slot; in case of inter-band SCell activation, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity of SCells being activated on the same band.

- In FR2, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity between active serving cells and SCell(s) being activated in FR2 intra-band CA.

- TSMTC\_MAX\_multiple\_scells is bounded to a minimum value of 10ms.

TFirstSSB\_MAX\_multiple\_scells: is the time to the end of the first complete SSB burst indicated by the SMTC after slot n + , further fulfilling:

- In FR1, in case of intra-band SCell activation, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot; in case of inter-band SCell activation, the first occasion when the SCells being activated are transmitting SSB burst.

- In FR2, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot.

Tuncertainty\_MAC\_multiple\_scells is the time period between reception of the activation command for PDCCH TCI, PDSCH TCI (when applicable) and SCell activation command of this unknown SCell.

Tuncertainty\_SP\_multiple\_scells is the time period between reception of the activation command for semi-persistent CSI-RS resource set for CQI reporting and SCell activation command of this unknown SCell.

Tuncertainty\_RRC\_multiple\_scells is the time period between reception of the RRC configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) and SCell activation command of this unknown SCell.

Trs, TFineTiming, and TRRC\_delay is defined in clause 8.3.2.

Longer delays for RRM measurement requirements, and in case of FR2 also SSB based RLM/BFD/CBD/L1-RSRP measurement requirements, can be expected during the cell detection time for unknown SCell activation.

The condition of known SCell in FR1 or FR2 is defined in clause 8.3.2.

If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2*prior to the activation command, TSMTC\_Scell follows *smtc1* or *smtc2* according to the physical cell ID of the target cell being activated. TSMTC\_MAX\_multiple\_scell follows *smtc1* or *smtc2* according to the physical cell IDs of the target cells being activated and the active serving cells.

The starting point and the end-point of an interruption window on PCell or any activated SCell in MCG for NR standalone mode, or on PSCell or any activated SCell in SCG for EN-DC mode is same as single SCell activation requirement in clause 8.3.2.

Upon receiving SCell activation command in slot *n,* if the start of the first complete SSB used in the *TX* in the different bands which have SCells being activated after *n*+THARQ+3ms are not aligned on time domain among

- SCells in different bands being activated by the same MAC CE if UE does not support per FR gap, or

- SCells in different FR1 bands being activated by the same MAC CE if UE supports per FR gap,

additional interruptions may be expected for the activated serving cells, where

- The number of additional interruptions is no more than the number of FR1 bands which have both SCell being activated for which the activation requirements involves *TFirstSSB\_MAX* *multiple\_scells* but not *Trs* and the active serving cell, and

- In each interruption occasion, the interruption length is defined in clause 8.2.2.2.2, and

- Longer activation delay may be expected for multiple SCell activation under one MAC CE with multiple interruptions, and

- *TX* is:

- *TFirstSSB*, for any scenario where *Tactivation\_time* *multiple\_scells*includes *TFirstSSB*;

- *TFirstSSB\_MAX* *multiple\_scells*, for any scenario where *Tactivation\_time* *multiple\_scells*includes *TFirstSSB\_MAX* *multiple\_scells*;

- *Tuncertainty\_MAC+TFineTiming* or *Tuncertainty\_MAC* *multiple\_scells+TFineTiming*, for any scenario where *Tactivation\_time* *multiple\_scells*includes *TFineTiming*.

Otherwise, no additional interruption is expected due to activation of multiple SCells.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed a first L1-RSRP measurement, the UE shall report lowest valid L1 SS-RSRP range if the UE has available uplink resources to report L1-RSRP for the SCell

**< End of change 10>**

**< Start of change 11>**

### 9.1.2 Measurement gap

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE does not support independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers.

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE supports independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide either per-FR measurement gap patterns for frequency range where UE requires per-FR measurement gap for concurrent monitoring of all frequency layers of each frequency range independently, or a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers of all frequency ranges.

If the UE is configured via LPP [34] to measure PRS for any RSTD, PRS-RSRP, and UE Rx-Tx time difference measurement defined in TS 38.215 [4], in order for the requirements in clauses 9.9.2, 9.9.3, and 9.9.4 to apply, the network must provide

- a single per-UE measurement gap pattern for concurrent monitoring of all positioning frequency layers and intra-frequency, inter-frequency and/or inter-RAT frequency layers of all frequency ranges, or

- for measurement gap patterns other than #24 and #25, if UE supports independent measurement gap patterns for different frequency ranges, per-FR measurement gap pattern for the frequency range for concurrent monitoring of all positioning frequency layers and intra-frequency, inter-frequency cells and/or inter-RAT frequency layers in the corresponding frequency range.

During the per-UE measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].

- is not required to conduct reception/transmission from/to the corresponding NR serving cells for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s), PRS measurement(s) and the signals used for random access procedure according to [7].

- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s), PRS measurement(s) and the signals used for random access procedure according to [7].

- is not required to conduct reception/transmission from/to the corresponding NR serving cells for NR-DC except the reception of signals used for RRM measurement(s), PRS measurement(s) and the signals used for random access procedure according to [7].

During the per-FR measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells in the corresponding frequency range for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].

- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s), PRS measurement(s) and the signals used for random access procedure according to TS38.321 [7].

- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells in the corresponding frequency range for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s), PRS measurement(s) and the signals used for random access procedure according to TS38.321 [7].

- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for NR-DC except the reception of signals used for RRM measurement(s), PRS measurement(s) and the signals used for random access procedure according to TS38.321 [7].

UEs shall support the measurement gap patterns listed in Table 9.1.2-1 based on the applicability specified in table 9.1.2-2 and 9.1.2-3. UE determines measurement gap timing based on gap offset configuration and measurement gap timing advance configuration provided by higher layer signalling as specified in TS 38.331 [2] and TS 36.331 [16].

Table 9.1.2-1: Gap Pattern Configurations

|  |  |  |
| --- | --- | --- |
| Gap Pattern Id | Measurement Gap Length (MGL, ms) | Measurement Gap Repetition Period  (MGRP, ms) |
| 0 | 6 | 40 |
| 1 | 6 | 80 |
| 2 | 3 | 40 |
| 3 | 3 | 80 |
| 4 | 6 | 20 |
| 5 | 6 | 160 |
| 6 | 4 | 20 |
| 7 | 4 | 40 |
| 8 | 4 | 80 |
| 9 | 4 | 160 |
| 10 | 3 | 20 |
| 11 | 3 | 160 |
| 12 | 5.5 | 20 |
| 13 | 5.5 | 40 |
| 14 | 5.5 | 80 |
| 15 | 5.5 | 160 |
| 16 | 3.5 | 20 |
| 17 | 3.5 | 40 |
| 18 | 3.5 | 80 |
| 19 | 3.5 | 160 |
| 20 | 1.5 | 20 |
| 21 | 1.5 | 40 |
| 22 | 1.5 | 80 |
| 23 | 1.5 | 160 |
| 24 | 10 | 80 |
| 25 | 20 | 160 |

Table 9.1.2-2: Applicability for Gap Pattern Configurations supported by the E-UTRA-NR dual connectivity UE or NR-E-UTRA dual connectivity UE

|  |  |  |  |
| --- | --- | --- | --- |
| Measurement gap pattern configuration | Serving cell | Measurement PurposeNote 5 | Applicable Gap Pattern Id |
| Per-UE | E-UTRA + FR1, or | non-NR RAT Note1,2 | 0,1,2,3 |
| Measurement gap | E-UTRA + FR2, or E-UTRA + FR1 + FR2 | FR1 and/or FR2 | 0-11, 24, 25 |
|  |  | non-NR RATNote1,2 and FR1 and/or FR2 | 0, 1, 2, 3, 4, 6, 7, 8,10, 24 |
|  | E-UTRA and, FR1 if configured | non-NR RAT Note1,2 | 0,1,2,3 |
|  | FR2 if configured |  | No gap |
|  | E-UTRA and, FR1 if configured | FR1 only | 0-11 |
|  | FR2 if configured |  | No gap |
|  | E-UTRA and, FR1 if configured | FR2 only | No gap |
| Per-FR | FR2 if configured |  | 12-23 |
| measurement gap | E-UTRA and, FR1 if configured | non-NR RAT Note1,2 and FR1 | 0, 1, 2, 3, 4, 6, 7, 8,10 |
|  | FR2 if configured |  | No gap |
|  | E-UTRA and, FR1 if configured | FR1 and FR2 | 0-11 |
|  | FR2 if configured |  | 12-23 |
|  | E-UTRA and, FR1 if configured | non-NR RAT Note1,2 and FR2 | 0, 1, 2, 3, 4, 6, 7, 8,10 |
|  | FR2 if configured |  | 12-23 |
|  | E-UTRA and, FR1 if configured | non-NR RAT Note1,2 and FR1 and FR2 | 0, 1, 2, 3, 4, 6, 7, 8,10 |
|  | FR2 if configured |  | 12-23 |
| Note: In E-UTRA-NR dual connectivity mode, if GSM or UTRA TDD or UTRA FDD inter-RAT frequency layer is configured to be monitored, only measurement gap pattern #0 and #1 can be used for per-FR gap in E-UTRA and FR1 if configured, or for per-UE gap. In NR-E-UTRA dual connectivity mode, if UTRA FDD inter-RAT frequency layer is configured to be monitored for SRVCC, only measurement gap pattern #0 and #1 can be used for per-FR gap in E-UTRA and FR1 if configured, or for per-UE gap.  NOTE 1: In E-UTRA-NR dual connectivity mode, non-NR RAT includes E-UTRA, UTRA and/or GSM. In NR-E-UTRA dual connectivity mode, non-NR RAT means E-UTRA, and UTRA for SRVCC.  NOTE 2: Void  NOTE 3: When E-UTRA inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, only Gap Pattern #0 can be used.  NOTE 4: For UE supporting *supportedGapPattern-NRonly-NEDC* or *measGapPatterns-NRonly-ENDC-r16* but not supporting *supportedGapPattern* for the corresponding gap patterns among GP2-11, the corresponding gap patterns are not applicable to measurement of non-NR RATs as defined in NOTE 1.  NOTE 5: Inclusion of positioning measurements: Measurement purpose which includes E-UTRA measurements includes also E-UTRA RSRP and E-UTRA RSRQ measurements for E-CID; measurement purpose which includes any of FR1 and FR2 measurements includes also RSTD, UE Rx-Tx, and PRS-RSRP measurements.  NOTE 6: Measurement gap patterns #24 and #25 can be requested [2] only when the UE is configured at least with any of RSTD, UE Rx-Tx, or PRS-RSRP measurements requiring such gaps and can only be used during the corresponding positioning measurement period | | | |

In E-UTRA-NR dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of TMG ms, the measurement gap starts at time TMG ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.

- if per-FR measurement gap for FR1 is configured with MG timing advance of TMG ms, the measurement gap for FR1 starts at time TMG ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.

- if per-FR measurement gap for FR2 is configured with MG timing advance of TMG ms, the measurement gap for FR2 starts at time TMG ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

In NR-E-UTRA dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of TMG ms, the measurement gap starts at time TMG ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.

- if per-FR measurement gap for FR1 is configured with MG timing advance of TMG ms and UE has NR serving cell in FR1, the measurement gap for FR1 starts at time TMG ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR1.

- if per-FR measurement gap for FR1 is configured with MG timing advance of TMG ms and UE doesn’t have NR serving cell in FR1, the measurement gap for FR1 starts at time TMG ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among SCG serving cells subframes.

- if per-FR measurement gap for FR2 is configured with MG timing advance of TMG ms, the measurement gap for FR2 starts at time TMG ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR2.

In NR-NR dual connectivity mode,

- If per-UE measurement gap is configured with MG timing advance of TMG ms, the measurement gap starts at time TMG ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.

- If per-FR measurement gap for FR1 is configured with MG timing advance of TMG ms, the measurement gap for FR1 starts at time TMG ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.

- If per-FR measurement gap for FR2 is configured with MG timing advance of TMG ms, the measurement gap for FR2 starts at time TMG ms advanced to the end of the latest SCG subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

**< End of change 11>**

**< Start of change 12>**

8.6.3A RRC based BWP switch delay on multiple CCs

The requirements in this clause only apply to the case when the same type of BWP switch (RRC based BWP switch) is performed on multiple CCs simultaneously or over partially overlapping time period.

The requirements in this clause shall apply:

* Active BWP switching or parameter change of its active BWPs for SpCell
* Parameter change of its active BWPs except parameter *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* for SCells

8.6.3A.1 Simultaneous RRC based BWP switch delay on multiple CCs

Requirements in this clause apply only if RRC based BWP switching on multiple CCs for NR-CA is triggered by a single RRC command.

For RRC-based BWP switch, after the UE receives RRC reconfiguration involving active BWP switching or parameter change of its active BWPs, UE shall be able to receive PDSCH/PDCCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWPs on the serving cells on which BWP switch occurs on the first DL or UL slot right after a time duration of slots which begins from the beginning of DL slot n, where

DL slot n is the last slot containing the RRC command, and

are defined in clause 8.6.3, and

for UE which is capable of type 1 BWP switching delay depending on UE capability *bwp-SwitchingDelay* [2]. for UE which is capable of type 2 BWP switching delay depending on UE capability *bwp-SwitchingDelay* [2], where D is the incremental delay for each additional CC involved in simultaneous BWP switch and depends on UE capability [13].

N is the number of CCs within the NR-CA configured for performing simultaneous BWP switch.

The UE is not required to transmit UL signals or receive DL signals during the time defined by on the cells where RRC-based BWP switch occurs.

8.6.3A.2 Non-simultaneous RRC based BWP switch delay on multiple CCs

In non-simultaneous case, the RRC-based BWP switch on multiple CCs is triggered over partially overlapping time period in different Cell groups. The delay requirements in this clause apply only if:

BWP switching on multiple CCs in different cell groups are triggered by separate RRC commands, and

UE is operating in NR-DC (FR1+FR2), and

UE is capable of per-FR gap, and

BWP switch does not involve SCS change.

For non-simultaneous RRC-based BWP switch, after the UE receives RRC reconfiguration involving active BWP switching or parameter change of its active BWPs, UE shall be able to receive PDSCH/PDCCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWPs on the serving cells on which BWP switch occurs on the first DL or UL slot right after a time duration of slots which begins from the beginning of DL slot n, where

DL slot n is the last slot containing the RRC command,

is the waiting time for RRC based BWP switch which is upper bounded by the ongoing BWP switch time in the first CG defined in clause 8.6.3A.1,

*M* is the number of CCs within the NR-CA configured for performing simultaneous BWP switch in the second CG; M=1 if the BWP switch is performed on single CC,

and are defined in clause 8.6.3, and

is defined in clause 8.6.3A.1.

The UE is not required to transmit UL signals or receive DL signals during the time defined by on the cells in the second CG where RRC-based BWP switch occurs.

**< End of change 12>**

**< Start of change 13>**

### 8.3.7 SCell Activation Delay Requirement for Deactivated SCell with Multiple Downlink SCells

The requirements in this clause shall apply for the UE configured with more than one SCells.

In EN-DC, NE-DC, standalone NR, or in one CG of NR-DC, the requirements in this clause shall apply when the following conditions are met:

- UE only receives one single MAC command for multiple SCell activation within the activation period defined in this clause

- in each single CG, there are no other SCell activation, deactivation, addition or release before activation is completed for all the SCells activated by the single MAC CE in this clause, and

- in EN-DC and NE-DC, there are no E-UTRAN SCell activation, deactivation, addition or release before multiple SCell activation is completed in this clause, and

- any to-be-activated unknown SCell has active serving cell(s) or known to-be-activated SCell(s) on the same band

In two CGs of NR-DC, the requirements in this clause shall apply when the following conditions are met:

- UE receives one MAC command per CG for multiple SCell activation within the activation period defined in this clause, and

- UE supports per-FR measurement gap capability, and

- any to-be-activated unknown SCell has active serving cell(s) or known to-be-activated SCell(s) on the same band

The delay within which the UE shall be able to activate the deactivated SCell with other downlink to-be-activated SCell(s) depends upon the specified conditions.

Upon receiving SCell activation command in slot *n* for more than one SCell, for each of the to-be-activated SCell, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command for the SCell being activated no later than in slot , where:

THARQ (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]

Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario.

If the SCell is known and belongs to FR1 and the measurement period of the SCell being activated is equal to or smaller than [2400ms], Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 known Scell with the measurement period larger than [2400ms] but does not have any parallel to-be-activated SCell which is FR1 unknown SCell.

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 unknown Scell

- otherwise, TFirstSSB\_MAX\_multiple\_scells + 5ms.

If the SCell is known and belongs to FR1 and the measurement period of the SCell being activated is larger than [2400ms], Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 unknown Scell

- otherwise, TFirstSSB\_MAX\_multiple\_scells + Trs + 5ms

If the SCell is unknown and belongs to FR1, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+Trs +5ms, if the SCell is not counted in N1

- The activation delay may be longer if SSB is not in the same half-frame on the SCell and the contiguous FR1 known cell or contiguous FR1 active serving cell

- otherwise, TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+Trs\*N1 +Trs +5ms

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, if the UE is not provided with any SMTC for the target SCell, Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2

If the SCell being activated belongs to FR2 and if there is no active serving cell on that FR2 band provided that PCell or PSCell is FR1:

If the target SCell is known to UE and semi-persistent CSI-RS is used for CSI reporting, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in clause 8.3.2.

If the target SCell is unknown to UE and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time\_multiple\_scells is:

- 3 ms + max(Tuncertainty\_MAC\_multiple\_scells +TFineTiming + 2ms, Tuncertainty\_SP\_multiple\_scells), if on the same band UE also has at least one parallel to-be-activated SCell which is FR2 known Scell. Tuncertainty\_MAC\_multiple\_scells =0 and Tuncertainty\_SP\_multiple\_scells =0 if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation commands at the same time.

If the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time\_multiple\_scells is:

- max(Tuncertainty\_MAC\_multiple\_scells + 5ms + TFineTiming, Tuncertainty\_RRC\_multiple\_scells + TRRC\_delay-THARQ), if on the same band UE also has at least one parallel to-be-activated SCell which is FR2 known Scell . Tuncertainty\_MAC\_multiple\_scells =0 if UE receives the SCell activation command and TCI state activation commands at the same time.

The requirements for FR2 unknown SCells apply provided that the parameter *ssb-PositionsInBurst* is same for the SCell and the known serving cell on the same FR2 band. The activation delay FR2 unknown SCell may be longer if SSB is not in the same half-frame on the SCell and the contiguous FR2 known cell.

Where,

N1 is the number counting for parallel FR1 unknown to-be-activated SCell(s) only except the ones which fulfilled the following conditions:

- contiguous to an active serving cell in the same band, or to a known SCell in the same band being activated by the same MAC PDU, and

- A single SSB is used in the unknown SCell; or multiple SSBs are used in the unknown SCell and TCI state indication for PDCCH is provided by the same MAC PDU used for SCell activation; and

- its *ssb-PositionInBurst* is same as the one of contiguous FR1 known cell or contiguous FR1 active serving cell, and

- its RTD with contiguous FR1 known cell or contiguous FR1 active serving cell is smaller than or equal to 260ns with respect to the to-be-activated SCell’s SSB numerology and its reception power difference with contiguous FR1 known cell or contiguous FR1 active serving cell is smaller than or equal to 6dB, and

- its SMTC offset is same as the one of contiguous FR1 known cell or contiguous FR1 active serving cell

However, when the following conditions are fulfilled, no activation requirement will be applied for this unknown SCell and other SCells being activated and counted in N1:

- contiguous to an active serving cell in the same band, or to a known SCell in the same band being activated by the same MAC PDU, and

- A single SSB is used in the unknown SCell; or multiple SSBs are used in the unknown SCell and TCI state indication for PDCCH is provided by the same MAC PDU used for SCell activation; and

- its *ssb-PositionInBurst* is same as the one of FR1 known cell or FR1 active serving cell, and

- its RTD with contiguous FR1 known cell or contiguous FR1 active serving cell is larger than 260ns with respect to the to-be-activated SCell’s SSB numerology or its reception power difference with contiguous FR1 known cell or contiguous FR1 active serving cell is larger than 6dB, and

- its SMTC offset is same as the one of FR1 known cell or FR1 active serving cell

TSMTC\_MAX\_multiple\_scells:

- In FR1, in case of intra-band SCell activation, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity between active serving cells and SCells being activated on the same band provided the cell specific reference signals from the active serving cells and the SCells being activated or released are available in the same slot; in case of inter-band SCell activation, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity of SCells being activated on the same band.

- In FR2, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity between active serving cells and SCell(s) being activated in FR2 intra-band CA.

- TSMTC\_MAX\_multiple\_scells is bounded to a minimum value of 10ms.

TFirstSSB\_MAX\_multiple\_scells: is the time to the end of the first complete SSB burst indicated by the SMTC after slot n + , further fulfilling:

- In FR1, in case of intra-band SCell activation, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot; in case of inter-band SCell activation, the first occasion when the SCells being activated are transmitting SSB burst.

- In FR2, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot.

Tuncertainty\_MAC\_multiple\_scells is the time period between reception of the activation command for PDCCH TCI, PDSCH TCI (when applicable) and SCell activation command of this unknown SCell.

Tuncertainty\_SP\_multiple\_scells is the time period between reception of the activation command for semi-persistent CSI-RS resource set for CQI reporting and SCell activation command of this unknown SCell.

Tuncertainty\_RRC\_multiple\_scells is the time period between reception of the RRC configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) and SCell activation command of this unknown SCell.

Trs, TFineTiming, and TRRC\_delay is defined in clause 8.3.2.

Longer delays for RRM measurement requirements, and in case of FR2 also SSB based RLM/BFD/CBD/L1-RSRP measurement requirements, can be expected during the cell detection time for unknown SCell activation.

The condition of known SCell in FR1 or FR2 is defined in clause 8.3.2.

If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2*prior to the activation command, TSMTC\_Scell follows *smtc1* or *smtc2* according to the physical cell ID of the target cell being activated. TSMTC\_MAX\_multiple\_scell follows *smtc1* or *smtc2* according to the physical cell IDs of the target cells being activated and the active serving cells.

The starting point and the end-point of an interruption window on PCell or any activated SCell in MCG for NR standalone mode, or on PSCell or any activated SCell in SCG for EN-DC mode is same as single SCell activation requirement in clause 8.3.2.

Upon receiving SCell activation command in slot *n,* if the start of the first complete SSB used in the *TX* in the different bands which have SCells being activated after *n*+THARQ+3ms are not aligned on time domain among

- SCells in different bands being activated by the same MAC CE if UE does not support per FR gap, or

- SCells in different FR1 bands being activated by the same MAC CE if UE supports per FR gap,

additional interruptions may be expected for the activated serving cells, where

- The number of additional interruptions is no more than the number of FR1 bands which have both SCell being activated for which the activation requirements involves *TFirstSSB\_MAX* *multiple\_scells* but not *Trs* and the active serving cell, and

- In each interruption occasion, the interruption length is defined in clause 8.2.2.2.2, and

- Longer activation delay may be expected for multiple SCell activation under one MAC CE with multiple interruptions, and

- *TX* is:

- *TFirstSSB*, for any scenario where *Tactivation\_time* *multiple\_scells*includes *TFirstSSB*;

- *TFirstSSB\_MAX* *multiple\_scells*, for any scenario where *Tactivation\_time* *multiple\_scells*includes *TFirstSSB\_MAX* *multiple\_scells*;

- *Tuncertainty\_MAC+TFineTiming* or *Tuncertainty\_MAC* *multiple\_scells+TFineTiming*, for any scenario where *Tactivation\_time* *multiple\_scells*includes *TFineTiming*.

Otherwise, no additional interruption is expected due to activation of multiple SCells.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed a first L1-RSRP measurement, the UE shall report lowest valid L1 SS-RSRP range if the UE has available uplink resources to report L1-RSRP for the SCell.

**< End of change 13>**