**3GPP TSG-RAN4 Meeting #101-e *R4-2120437***

**Electronic meeting, Nov. 1 – 12, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.133** | **CR** | **TBD** | **rev** | **-** | **Current version:** | **17.3.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Big CR to TS 38.133 Rel-16 WIs RRM maintenance Part 4 (Rel-17) | | | | | | | | | |
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| ***Source to WG:*** | MCC, CATT | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_CSIRS\_L3meas  SRVCC\_NR\_to\_UMTS-Perf  NR\_newRAT-Core  TEI16  LTE\_NR\_DC\_CA\_enh  NR\_HST | | | | |  | ***Date:*** | | | 2021-11-16 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | A |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This big CR merges the multiple endorsed draft CRs. The reason for change in each endorsed draft CR is copied below.   1. R4-2117342 Draft CR on CSI-RS based L3 measurement requirements    * The clause number for CSI-RS based inter-frequency measurement in clause 9.1.5.2 is missing.    * The relation between SSB layer and CSI-RS layer is missing in clause 9.1.5.2. 2. R4-2118422 Draft CR on CSI-RS based measurement requirements    * In section 9.10.2.2, the condition of “the gap between two 5ms windows” is duplicating with the following two bullets, hence can be removed as the following two bullets are more clear.    * In section 9.10.2.5, the CSI resource period should be smaller than MGRP. The condition needs to be added.    * Brackets need to be removed. 3. R4-2120393 Correction to SRVCC TCs    * Event B1 is used in TC A.6.6.5.1, However, b2-threshold is also configured in this TC. It may cause confusion.    * To correct typos. 4. R4-2118405 draftCR on L1-RSRP scaling factor -R17    * In current spec., the scaling factor P for L1-RSRP measurements will be P=, when SSB is partially overlapped with measurement gap (TSSB <MGRP) and SSB is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap, or P=, when CSI-RS is partially overlapped with measurement gap (TCSI-RS < MGRP) and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap. However, considering the condition ‘SMTC occasion is partially or fully overlapped with measurement gap’ which implies will always smaller or equal to MGRP, the min(.) function is redundant.    * Another error in section 8.1.2.2 as followx.   , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap.  P factor shall be the same equation with other section as   1. R4-2118925 Maintenance CR for CSSF - R17    * In clause 9.1.5 of TS 38.133, CSSF related descriptions need update. For instance, the clause number of CSI-RS based L3 measurement are also undetermined. 2. R4-2120255 Draft CR to TS 38.133 Rel-17 WIs RRM core part maintenance    * The following draft CR endorsed in RAN4#100 e-meeting is not captured in the latest 38.133 spec version 17.3.0.      + 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.    * Besides, the condition “Srxlev ≤ SnonIntraSearchP and Squal ≤ SnonIntraSearchQ” in clause 4.4.1 is not correct. 3. R4-2118791 Correction to requirements of R16 NR RRC-based procedures\_R17    * CAT A CR of R4-2120398    * Delay requirements involved with RRC procedures in 38.133 always refers to RRC latency defined in 38.331 cl.12. In other words, it is implied that these procedures are triggered by NR RRC messages.    * Take RRC-based BWP switching delay requirements as an example:  |  | | --- | | TS 38.133 cl.8.6.3  For RRC-based BWP switch, after the UE receives RRC reconfiguration involving active BWP switching or parameter change of its active BWP, UE shall be able to receive PDSCH/PDCCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell 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  is determined by the smaller SCS between the SCS before BWP switch and the SCS after BWP switch if the BWP switch involves changing of SCS.  is the length of the RRC procedure delay in ms as defined in clause 12 in TS 38.331 [2], and  is the time used by the UE to perform BWP switch. |  * + However, this assumption is not correct since RRC-based BWP switching on NR SCG serving cells can also be triggered by E-UTRA RRCConnectionReconfiguration message (in which NR RRCReconfiguration embeded) if SRB3 is not established. This leads to the following consequences:     - It's E-UTRA RRC latency defined in 36.331 cl.11.2 rather than NR RRC latency shall be used. Please note that it's not merely an editorial change because RRC latency requirements for NR RRC message directly sent via SRB1/SRB3 and NR RRC message embedded in E-UTRA RRC messages are different. Still taking RRC-based BWP switching delay as an example, NR RRC latency for RRCReconfiguration is 10ms, but LTE RRC latency for E-UTRA RRCConnectionReconfiguration involving NR SCG modification is 20ms. Using NR RRC latency significantly tightens requirements.  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | TS 38.331. cl.12   |  |  |  |  |  | | --- | --- | --- | --- | --- | | RRC reconfiguration | *RRCReconfiguration* | *RRCReconfigurationComplete* | 10 |  |   TS 36.331 cl.11.2   |  |  |  |  |  | | --- | --- | --- | --- | --- | | RRC connection reconfiguration (NR SCG establishment/ /modification/release) | *RRCConnection*  *Reconfiguration* | *RRCConnection*  *ReconfigurationComplete* | 20 |  | |  * + - For Async EN-DC, slot/subframe boundary of MCG serving cells and SCG serving cells are not aligned. So the last TTI containing RRC messages in MCG PCell may overlap with multiple SCG slots/subframes. It's not clear which slot/subframe is the starting point for counting delay requirements.   + So we purpose:     - To clarify that RRC latency in 36.331 shall be referred if the procedure is triggered by E-UTRA RRC message, otherwise RRC latency in 38.331 shall be referred.     - To clarify that the starting slot/subframe for delay requirements counting (the "slot n/subframe n") should be the last slot/subframe which overlapps with the last TTI containing RRC messages.   + After initial check, we find that at least following R16 requirements should be clarified:     - R16 direct SCell activation delay in cl.8.3.4, 8.3.5, 8.3.9, 8.3.10     - R16 multi-CC RRC-based BWP switching delay in cl.8.6.3A.     - R16 NR-U RRC based TCI state switching delay in cl.8.10A.5     - R16 conditional PSCell change delay in cl.8.11B     - R16 RRC-based UL spatial relation switching delay in cl.8.12.5     - R16 UE-specific CBW changing delay in cl.8.13.2  1. R4-2119345 CR on scheduling restriction for inter-band CA    * In RAN4#100-e, CR R4-2115432 was endorsed, and it specifies that the existing scheduling restriction due to L1 measurement apply provided UE is not configured with simultaneous UL/DL between two bands if the UE does not have the capability of supporting *simultaneousRxTxInterBandCA*.    * For scheduling restriction due to L3 measurement, UE capability *simultaneousRxTxInterBandCA* also needs to be considered. This is missed in the existing scheduling requirements in clause 9.2.5.3.    * Since RAN4 has already defined in clause 9.2.5.3.1 the scheduling restriction for the case where UL transmission overlaps with L3 SMTC in the same serving cell, it is straightforward to use the same requirements for the overlapping (between UL and L3 SMTC) among different serving cells. 2. R4-2120257 Draft CR to TS 38.133 Rel-17 WIs RRM perf part maintenance    * The following draft CRs endorsed in RAN4#100 e-meeting are not captured in the latest 38.133 spec version 17.3.0. The reason for changes in each endorsed draft CR is copied below.   **LTE\_NR\_DC\_CA\_enh**   * 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   **NR\_HST**   * R4-2111965, Draft CR on cell reselection test case for HST in FR1, CATT * In this HST test case, there are multiple mistakes:   + - Parameter Thresh**x, high** is incorrect.     - T3 is redundant  1. R4-2120390 Requirements on UL CCs in intra-band UL CA    * To introduce 2 UL CCs in the same FR as of PSCell in EN-DC | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The summary of change in each endorsed draft CR is copied below.   1. R4-2117342 Draft CR on CSI-RS based L3 measurement requirements    * Add the clause number for CSI-RS based inter-frequency measurement in clause 9.1.5.2.    * Add clarification on the relation between SSB layer and CSI-RS layer in clause 9.1.5.2.    * Remove the brackets in CSI-RS based measurement requirements.    * Some typo corrections. 2. R4-2118422 Draft CR on CSI-RS based measurement requirements    * The above sections are changed accordingly. 3. R4-2120393 Correction to SRVCC TCs    * For 6.3.1.6:      + typos are corrected;      + RF channels for UTRA Cell is added in Table A.6.3.1.6-4.    * For 6.5.5.1:      + Threshold for event B2 is removed.      + RF channel for UTRA Cell is corrected.      + Typos are corrected.      + NR measurement quantity is removed since event B1 doesn't need NR intra-frequency measurements. 4. R4-2118405 draftCR on L1-RSRP scaling factor -R17    * In section 8.1.2.2, replace MGRP with TSMTCperiod.    * Replace the min(.) function with TSMTCperiod only in other section. 5. R4-2118925 Maintenance CR for CSSF - R17    * Update the clause number of CSI-RS based L3 measurement. 6. R4-2120255 Draft CR to TS 38.133 Rel-17 WIs RRM core part maintenance    * Add CA measurement in the absence or expiration of T331 in clause 4.4.2.2.    * The condition “Srxlev ≤ SnonIntraSearchP and Squal ≤ SnonIntraSearchQ” is change to “Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ”    * Other corrections on formats and typos. 7. R4-2118791 Correction to requirements of R16 NR RRC-based procedures\_R17    * "slot/subframe n" and RRC procedure delay requirements for RRC-based procedures mentioned above are clarified. 8. R4-2119345 CR on scheduling restriction for inter-band CA    * Update the scheduling restriction requirements for intra-frequency measurement, such that when UE is performing L3 measurement on one serving layer, it is not required to transmit on a serving cell in a different band it does not support simultaneousRxTxInterBandCA for the band pair.    * Remove mentioning of clause 9.2.5.3.3 (scheduling restriction requirements for intra-frequency measurement) in clasue 3.6.9, which means the updated scheduling restriction in clause 9.2.5.3.3 would apply. 9. R4-2120257 Draft CR to TS 38.133 Rel-17 WIs RRM perf part maintenance    * The summary of change in each endorsed draft CR is copied below:   **LTE\_NR\_DC\_CA\_enh**   * + - R4-2114168, DraftCR (R16) Clean-up of test cases for Direct SCell activation and SCell dormancy, Ericsson       * A.4.5.6.5.1 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.4.5.6.5.2 can skip the test case in current clause A.4.5.6.5.1.*)   * + - * + Removed brackets around values       * A.4.5.6.5.2 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.4.5.6.5.2 can skip the test case in clause A.4.5.6.5.1.*)   * + - * + Removed brackets around values   **NR\_HST**   * + - R4-2111965, Draft CR on cell reselection test case for HST in FR1, CATT       * Change parameter Thresh**x, high** to Thresh**x, highP**       * Delete T3  1. R4-2120390 Requirements on UL CCs in intra-band UL CA    * The current requirements allow only one UL in the FR of PSCell in EN-DC.    * This means intra-band UL CA with sPcell and UL SCell cannot be supported.    * According to TS 38.101-3, there is EN-DC configuration with 2 UL intra-band in band n79:   5.5B.4.1 Inter-band EN-DC configurations within FR1 (two bands)  **Table 5.5B.4.1-1: Inter-band EN-DC configurations within FR1 (two bands)**   | **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration**  **(NOTE 1)** | **Single UL allowed** | **DL interruption allowed**  **(Note 14)** | | --- | --- | --- | --- | | DC\_8A\_n79A7  DC\_8A\_n79C | DC\_8A\_n79A  DC\_8A\_n79C | No | No |  * + The following is included on number of UL CCs in EN-DC:     - up to 1 UL (or 2 UL if SUL is configured) in SCell in the FR of PSCell | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are coppied below.   1. R4-2117342 Draft CR on CSI-RS based L3 measurement requirements    * The CSI-RS based measurement requirements are incomplete. 2. R4-2118422 Draft CR on CSI-RS based measurement requirements    * The CSI-RS based measurement requirements are not completely correct. 3. R4-2120393 Correction to SRVCC TCs    * Conformant UE may fail the test 4. R4-2118405 draftCR on L1-RSRP scaling factor -R17    * The spec. is redundant and introduce unavoidable misunderstanding. 5. R4-2118925 Maintenance CR for CSSF - R17    * In clause 9.1.5, CSSF related descriptions are incomplete in terms of clause numbers. 6. R4-2120255 Draft CR to TS 38.133 Rel-17 WIs RRM core part maintenance    * The mobility requirements in RRC\_IDLE and RRC\_INACTIVE state will be incorrect. 7. R4-2118791 Correction to requirements of R16 NR RRC-based procedures\_R17    * Conformant UE may fail the test. 8. R4-2119345 CR on scheduling restriction for inter-band CA    * UE is required to do simultaneous L3 measurement in one band and UL transmission in another band even UE does not support simultaneousRxTxInterBandCA for the band pair.    * No scheduling restriction requirement apply for a valid NW configuration. 9. R4-2120257 Draft CR to TS 38.133 Rel-17 WIs RRM perf part maintenance    * The consequences if not approved for each endorsed draft CR are coppied below.   **LTE\_NR\_DC\_CA\_enh**   * 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   **NR\_HST**   * 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.  1. R4-2120390 Requirements on UL CCs in intra-band UL CA    * RRM rerformance for the UE supporting UL intra-band CA may not be guaranteed if configured with also UL SCell in EN-DC. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 1. R4-2117342 Draft CR on CSI-RS based L3 measurement requirements    * 9.1.5.2, 9.10.2.5, 9.10.3.5 2. R4-2118422 Draft CR on CSI-RS based measurement requirements    * 9.10.2.2, 9.10.2.5 3. R4-2120393 Correction to SRVCC TCs    * A.6.3.1.6, A.6.6.5.1 4. R4-2118405 draftCR on L1-RSRP scaling factor -R17    * 8.1.2.2, 8.1.3.2, 8.5.2.2, 8.5.3.2, 8.5.5.2, 8.5.6.2, 9.5.4 5. R4-2118925 Maintenance CR for CSSF - R17    * 9.1.5 6. R4-2120255 Draft CR to TS 38.133 Rel-17 WIs RRM core part maintenance    * 4.4.1 4.4.2.2 4.2.2.11 5.4.1 5.4.2. 7. R4-2118791 Correction to requirements of R16 NR RRC-based procedures\_R17    * 8.3.4, 8.3.5. 8.3.9, 8.3.10, 8.6.3A.1, 8.10A.5, 8.11B.2, 8.12.5, 8.13.2 8. R4-2119345 CR on scheduling restriction for inter-band CA    * 9.2.5.3, 3.6.9 9. R4-2120257 Draft CR to TS 38.133 Rel-17 WIs RRM perf part maintenance   **LTE\_NR\_DC\_CA\_enh**   * R4-2114168, DraftCR (R16) Clean-up of test cases for Direct SCell activation and SCell dormancy, Ericsson * A.4.5.6.5.1, A.4.5.6.5.2   **NR\_HST**   * R4-2111965, Draft CR on cell reselection test case for HST in FR1, CATT * A.6.1.2.5  1. R4-2120390 Requirements on UL CCs in intra-band UL CA    * 3.6.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Corresponding changes to R15 requirements related to RRC-based procedures in 38.133 and TCs are captured by other CRs. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of Change 1-CR R4-2120390 and R4-2119345>

==========================first change request (R4-2120390) =============================

3.6.2.2 Number of serving carriers for EN-DC

Requirements for EN-DC operation of E-UTRA and NR with E-UTRA PCell and NR PSCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 7 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PSCell, up to 1 UL (or 2 UL if SUL is configured) in SCell in the FR of PSCell and up to 1 UL (or 2 UL if SUL is configured) in SCell in different FR with PSCell.

- SUL may be configured together with one of the UL

The applicable number of E-UTRA CC for EN-DC in the MCG for both UL and DL is specified in TS 36.133 [15].

==========================second change request (R4-2119345) =============================

### 3.6.9 Applicability of requirements for scheduling availability

The scheduling availability requirements in clause 8.1.7.3, 8.5.7.3, 8.5.8.3, 9.5.6.3 and 9.10.2.6.2 assumes that:

- The UE is not configured with simultaneous UL/DL between two FR2 bands if the UE does not have the capability of supporting *simultaneousRxTxInterBandCA*, and

- The UE is not configured with mixed numerology on two FR2 CCs if the UE does not have the capability of supporting simultaneous reception with two different numerologies between FR2 CCs in DL.

The scheduling availability requirements in clause 8.1.7.1, 8.1.7.2, 8.5.7.1, 8.5.7.2, 8.5.8.1, 8.5.8.2, 9.5.6.1, 9.5.6.2, 9.8.6.1, and 9.8.6.2 assumes that the UE is not configured with simultaneous UL/DL between two FR1 bands if the UE does not have the capability of supporting *simultaneousRxTxInterBandCA*.

The scheduling availability requirements in clause 8.1.7.4, 8.5.7.4, 8.5.8.4, 9.5.6.4 and 9.8.6.4 assumes that the UE is not configured with simultaneous UL/DL between FR1 and FR2 bands if the UE does not have the capability of supporting *simultaneousRxTxInterBandCA* on this band combination.

<End of Change 1>

<Start of Change 2-CR R4-2120255>

==========================first change request (R4-2120255) =============================

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.

==========================second change request (R4-2120255) =============================

#### 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 or 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-RAT 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 [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 E-UTRAN inter-RAT mobility measurements, and

- at least 1 E-UTRAN inter-RAT carrier which is not configured for E-UTRAN inter-RAT 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 or 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], respectively.

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

==========================third change request (R4-2120255) =============================

### 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 Change 2>

<Start of Change 3-CR R4-2118405 and R4-2118791>

==========================first change request (R4-2118405) =============================

#### 8.1.2.2 Minimum requirement

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

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

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

TEvaluate\_out\_SSB and TEvaluate\_in\_SSB are defined in Table 8.1.2.2-2 for FR2 with scaling factor N=8.

For FR1,

- , when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, and these measurement gaps are overlapping with some but not all occasions of the SSB; and

- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- , when RLM-RS resource is not overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion (TSSB < TSMTCperiod).

- P is Psharing factor, when the RLM-RS resource is not overlapped with measurement gap and RLM-RS resource is fully overlapped with SMTC period (TSSB = TSMTCperiod).

- , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and

- TSMTCperiod ≠ MGRP or

- TSMTCperiod = MGRP and TSSB < 0.5 × TSMTCperiod

- , when the RLM-RS is partially overlapped with measurement gap and the RLM-RS is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TSSB = 0.5 × TSMTCperiod

- , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap

- , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion (TSSB = TSMTCperiod) and SMTC occasion is partially overlapped with measurement gap (TSMTCperiod < MGRP)

- Psharing factor = 1, if the RLM-RS resource outside measurement gap is

* not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and,
* not overlapped by the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.

- Psharing factor = 3, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of *smtc2*is present, TSMTCperiod follows *smtc2*; Otherwise TSMTCperiod follows *smtc1.* TSMTCperiod is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Longer evaluation period would be expected if the combination of RLM-RS resource, SMTC occasion and measurement gap configurations does not meet previous conditions.

…

==========================second change request (R4-2118405) =============================

#### 8.1.3.2 Minimum requirement

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

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

- TEvaluate\_out\_CSI-RS and TEvaluate\_in\_CSI-RS are defined in Table 8.1.3.2-1 for FR1.

- TEvaluate\_out\_CSI-RS and TEvaluate\_in\_CSI-RS are defined in Table 8.1.3.2-2 for FR2 with scaling factor N=1.

The requirements of TEvaluate\_out\_CSI-RS and TEvaluate\_in\_CSI-RS apply provided that the CSI-RS for RLM is not in a resource set configured with repetition ON. The requirements do not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for RLM and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.

For FR1,

- , when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, and these measurement gaps are overlapping with some but not all occasions of the CSI-RS; and

- P = 1, when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when the RLM-RS resource is not overlapped with measurement gap and also not overlapped with SMTC occasion.

- , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is not overlapped with SMTC occasion (TCSI-RS < MGRP)

- , when the RLM-RS resource is not overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod).

- P = Psharing factor, when the RLM-RS resource is not overlapped with measurement gap and RLM-RS resource is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod).

- , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and

- TSMTCperiod ≠ MGRP or

- TSMTCperiod = MGRP and TCSI-RS < 0.5 × TSMTCperiod

- , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TCSI-RS = 0.5 × TSMTCperiod

- , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap

- , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod) and SMTC occasion is partially overlapped with measurement gap (TSMTCperiod < MGRP)

- Psharing factor = 1, if the RLM-RS resource outside measurement gap is

- not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and,

- not overlapped by the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.

- Psharing factor = 3, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of *smtc2*is present, TSMTCperiod follows *smtc2*; Otherwise TSMTCperiod follows *smtc1.* TSMTCperiod is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for RLM and SMTC means that CSI-RS based RLM is within the SMTC window duration.

Longer evaluation period would be expected if the combination of RLM-RS resource, SMTC occasion and measurement gap configurations does not meet previous conditions.

…

=============================third change request (R4-2118791) ==========================

### 8.3.4 Direct SCell Activation at SCell addition

The requirements in this clause apply for UE being configured in the RRC reconfiguration message, TS 38.331 [2], with one SCell for which the parameter *sCellState* is set to *activated*. If the RRC reconfiguration message for direct SCell activation also configures PSCell addition or PSCell change, the direct SCell activation delay may be longer than the requirements defined in this clause.

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

where:

- Slot n is the last slot overlapping with the PDSCH containing the RRC reconfiguration message,

- Ndirect = TRRC\_Process + T1 + 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 + T1 + THARQ + Tactivation\_time + TCSI\_Reporting

*-* TRRC\_Process: RRC procedure delay as specified in clause 11.2 of TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC procedure delay defined in clause 12 of TS 38.331 [2],

*-* T1: Delay from slot until the transmission of *RRCReconfigurationComplete* message,

Note: T1 is UE implementation dependent.

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

*-* If the SCell is 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 is equal to or smaller than [1280ms].

- TFirstSSB\_MAX + Trs + 5ms, if measurement period is larger than [1280]ms.

*-* Otherwise, Tactivation\_time and TCSI\_Reporting are specified in clause 8.3.2, where the following definitions of TFirstSSB and TFirstSSB\_MAX shall override the existing ones:

- TFirstSSB: the time to the end of the first complete SSB burst indicated by the SMTC after slot n +

- TFirstSSB\_MAX: the time to the end of the first complete SSB burst indicated by the SMTC after slot n +

- 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 SCell being activated is 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.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS38.321 [7] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

The SCell is known provided the following conditions are met for the SCell:

- During the last 5 seconds before the reception of the direct SCell configuration command:

- the UE has sent a valid measurement report for the SCell being directly activated, and

- the SSB measured remains detectable according to the cell identification conditions specified in sections 9.2 and 9.3,

- the SSB measured during the period equal to [5] seconds also remains detectable during the SCell activation delay according to the cell identification conditions specified in clause 9.2 and 9.3.

Otherwise, the SCell is unknown.

The UE may be allowed to cause interruptions to serving cells on other component carriers during an interruption window, as specified in clause 8.2. The starting point of an interruption window on spCell or any activated SCell shall not occur before slot *n*+1, and shall not occur after slot *n+*1+, where NR slot length is with respect to the numerology of the SCell being activated, and *TX* is:

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

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

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

The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

Starting from the slot until the UE has completed the direct SCell activation, the UE shall report CQI index = 0 (out of range) if the UE has available uplink resources to report CQI for the SCell.

===========================fourth change request (R4-2118791) =============================

### 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. The UE shall be capable to transmit valid CSI report and apply actions for the directly activated SCell no later than in slot ,

Where:

- Slot n is the last slot overlapping with the PDSCH containing RRC reconfiguration message.

- 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 as specified in clause 11.2 of TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the 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 *TFirstSSB\_MAX*shall override the existing ones:

- TFirstSSB: the time to the end of the first complete SSB burst indicated by the SMTC after slot n +

- TFirstSSB\_MAX: the time to the end of the first complete SSB burst indicated by the SMTC after slot n +

- 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 SCell being activated is 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.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS 38.321 [7] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

The SCell is known provided the following conditions are met for the SCell:

- During the last 5 seconds before the reception of the direct SCell configuration command:

- the UE has sent a valid measurement report for the SCell being directly activated, and

- the SSB measured remains detectable according to the cell identification conditions specified in sections 9.2 and 9.3,

- the SSB measured during the period equal to [5] seconds also remains detectable during the SCell activation delay according to the cell identification conditions specified in clause 9.2 and 9.3.

Otherwise, the SCell is unknown.

The UE may be allowed to cause interruptions to PCell during an interruption window, as specified in clause 8.2. The starting point of an interruption window on PCell shall not occur before slot *n*+1+, and not occur after slot *n*+1+, where NR slot length is with respect to the numerology of the SCell being activated, and *TX* is:

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

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

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

The length of the interruption window depends on the frequency band relation between the aggressor SCell and the victim PCell.

Starting from the slot and until the UE has completed the direct SCell activation, the UE shall report CQI index = 0 (out of range) if the UE has available uplink resources to report CQI for the SCell.

==========================fifth change request (R4-2118791) ============================

### 8.3.9 Direct SCell Activation of Multiple Downlink SCells at SCell addition

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

In EN-DC, NE-DC, stand-alone 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 RRC reconfiguration message for direct activation of SCells within the activation period defined in this clause,

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

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

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

- UE receives one RRC message per CG for direct activation of SCells within the activation period defined in this clause,

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

where:

- Slot n is the last slot overlapping with the PDSCH containing the RRC reconfiguration message.

- Ndirect\_multiple\_scells = TRRC\_Process + T1 + Tactivation\_time\_multiple\_scells + TCSI\_Reporting - 3ms for the cases specified in clause 8.3.7 that TCI state is not indicated within Tactivation\_time; otherwise, Ndirect\_multiple\_scells = TRRC\_Process + T1 + THARQ + Tactivation\_time\_multiple\_scells + TCSI\_Reporting

*- T1* and *TRRC\_Process* are specified in clause 8.3.4,

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

*- Tactivation\_time\_multiple\_scells* and *TCSI\_Reporting* are specified in clause 8.3.7, where the following definition of *TFirstSSB*, *TFirstSSB\_MAX*, and *TFirstSSB\_MAX\_multiple\_scells*shall override the existing ones:

*- TFirstSSB* and *TFirstSSB\_MAX*: as specified in clause 8.3.4,

- *TFirstSSB\_MAX\_multiple\_scells*: 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.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS38.321 [7] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

The UE may be allowed to cause interruptions to serving cells on other component carriers during an interruption window, as specified in clause 8.2. The starting point of an interruption window on spCell or any activated SCell shall not occur before slot *n*+1+, and shall not occur after slot *n+*1+, where NR slot length is with respect to the numerology of the SCell being activated, and *TX* is:

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

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

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

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

The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

Starting from the slot until the UE has completed the direct SCell activation, the UE shall report CQI index = 0 (out of range) if the UE has available uplink resources to report CQI for the SCells.

### 8.3.10 Direct SCell Activation of Multiple Downlink SCells at Handover

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

In MCG of NE-DC, MCG of NR-DC, or in stand-alone NR, the requirements in this clause shall apply when the following conditions are met:

- UE does not receive any RRC reconfiguration message for direct activation of SCells within the activation period defined in this clause,

- there is no other SCell activation, deactivation, addition or release before direct activation is completed for all the SCells activated by the single RRC reconfiguration message in this clause, and

- in NE-DC, there is no E-UTRAN SCell activation, deactivation, addition or release before the direct activation of SCells in this clause is completed.

The UE shall configure the SCells in activated state upon successful completion of the RRC reconfiguration procedure within the specified delay. The UE shall be capable to transmit valid CSI report and apply actions for the directly activated SCells no later than in slot where:

- Slot n is the last slot overlapping with the PDSCH containing the RRC reconfiguration message,

- Ndirect\_multiple\_scells = TRRC\_process + Tinterrupt + T2 + T3 + Tactivation\_time\_multiple\_scells + TCSI\_Reporting - 3ms for the cases specified in clause 8.3.7 that TCI state is not indicated within Tactivation\_time; otherwise, Ndirect\_multiple\_scells = TRRC\_process + Tinterrupt + T2 + T3 + THARQ + Tactivation\_time\_multiple\_scells + TCSI\_Reporting

- *TRRC\_Process, Tinterrupt,T2*, and *T3* are specified in clause 8.3.5,

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

*- Tactivation\_time\_multiple\_scells* and *TCSI\_Reporting* are specified in clause 8.3.7, where the following definitions of *TFirstSSB*, *TFirstSSB\_MAX*, and *TFirstSSB\_MAX\_multiple\_scells* shall override the existing ones:

- *TFirstSSB*, *TFirstSSB\_MAX*: as specified in clause 8.3.5,

- TFirstSSB\_MAX\_multiple\_scell: 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.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS 38.321 [7] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

The UE may be allowed to cause interruptions to PCell during an interruption window, as specified in clause 8.2. The starting point of an interruption window on PCell shall not occur before slot *n*+1+, and not occur after slot *n*+1+, where NR slot length is with respect to the numerology of the SCell being activated, and *TX* is:

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

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

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

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

The length of the interruption window depends on the frequency band relation between the aggressor SCell and the victim PCell.

Starting from the slot and until the UE has completed the direct SCell activation, the UE shall report CQI index = 0 (out of range) if the UE has available uplink resources to report CQI for the SCells.

<End of Change 3>

<Start of Change 4-CR R4-2118405 and R4-2118791>

==========================first change request (R4-2118405) ============================

#### 8.5.2.2 Minimum requirement

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

The value of TEvaluate\_BFD\_SSB is defined in Table 8.5.2.2-1 for FR1.

The value of TEvaluate\_BFD\_SSB is defined in Table 8.5.2.2-2 for FR2 with scaling factor N=8

For FR1,

- , when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB.

- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- , when BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (TSSB < TSMTCperiod).

- P = Psharing factor, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC period (TSSB = TSMTCperiod).

- , when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and

- TSMTCperiod ≠ MGRP or

- TSMTCperiod = MGRP and TSSB < 0.5 × TSMTCperiod

- , when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TSSB = 0.5\*TSMTCperiod

- , when the BFD-RS resource is partially overlapped with measurement gap (TSSB <MGRP) and the BFD-RS resource is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap.

- , when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion (TSSB = TSMTCperiod) and SMTC occasion is partially overlapped with measurement gap (TSMTCperiod < MGRP)

Psharing factor = 1, if the BFD-RS resource outside measurement gap is

- not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and;

- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.

- Psharing factor = 3, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, TSMTCperiod corresponds to the value of higher layer parameter *smtc2*; Otherwise TSMTCperiod corresponds to the value of higher layer parameter *smtc1*. TSMTCperiod is the shortest SMTC period among all CCs in the same FR2 band, given the SMTC offset of all CCs in FR2 provided the same offset.

Longer evaluation period would be expected if the combination of BFD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

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==========================second change request (R4-2118405) ============================

#### 8.5.3.2 Minimum requirement

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

The value of TEvaluate\_BFD\_CSI-RS is defined in Table 8.5.3.2-1 for FR1.

The value of TEvaluate\_BFD\_CSI-RS is defined in Table 8.5.3.2-2 for FR2 with N=1. The requirements of TEvaluate\_BFD\_CSI-RS apply provided that the CSI-RS for BFD is not in a resource set configured with repetition ON. The requirements shall not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for BFD and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.

For FR1,

- , when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS.

- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when the BFD-RS resource is not overlapped with measurement gap and also not overlapped with SMTC occasion.

- , when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is not overlapped with SMTC occasion (TCSI-RS < MGRP)

- , when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod).

- P = Psharing factor, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod).

- , when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and

- TSMTCperiod ≠ MGRP or

- TSMTCperiod = MGRP and TCSI-RS < 0.5 × TSMTCperiod

- , when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TCSI-RS = 0.5 × TSMTCperiod

- , when the BFD-RS resource is partially overlapped with measurement gap (TCSI-RS < MGRP) and the BFD-RS resource is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap.

- , when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod) and SMTC occasion is partially overlapped with measurement gap (TSMTCperiod < MGRP)

- Psharing factor = 1, if the BFD-RS resource outside measurement gap is

- not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and;

- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured,

- Psharing factor = 3, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, TSMTCperiod corresponds to the value of higher layer parameter *smtc2*; Otherwise TSMTCperiod corresponds to the value of higher layer parameter *smtc1*. TSMTCperiod is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for BFD and SMTC means that CSI-RS for BFD is within the SMTC window duration.

Longer evaluation period would be expected if the combination of the BFD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

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==========================third change request (R4-2118405) ============================

#### 8.5.5.2 Minimum requirement

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

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

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

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

where,

For FR1,

- , when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB,

- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- , when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (TSSB < TSMTCperiod).

- P is Psharing factor, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC period (TSSB = TSMTCperiod).

- , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and

- TSMTCperiod ≠ MGRP or

- TSMTCperiod = MGRP and TSSB < 0.5 × TSMTCperiod

- , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TSSB = 0.5 × TSMTCperiod

- , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap

- , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion (TSSB = TSMTCperiod) and SMTC occasion is partially overlapped with measurement gap (TSMTCperiod < MGRP)

- Psharing factor = 1, if the candidate beam detection RS outside measurement gap is

- not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and;

- not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1 data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured

- Psharing factor = 3, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of *smtc2*is present, TSMTCperiod follows *smtc2*; Otherwise TSMTCperiod follows *smtc1.* TSMTCperiod is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Longer evaluation period would be expected if the combination of the CBD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

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==========================fourth change request (R4-2118405) ============================

#### 8.5.6.2 Minimum requirement

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

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

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

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

For FR1,

- , when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and

- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when candidate beam detection RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.

- , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is not overlapped with SMTC occasion (TCSI-RS < MGRP)

- , when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod).

- P = Psharing factor, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod).

- , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and

- TSMTCperiod ≠ MGRP or

- TSMTCperiod = MGRP and TCSI-RS < 0.5 × TSMTCperiod

- , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TCSI-RS = 0.5 × TSMTCperiod

- , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap

- , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod) and SMTC occasion is partially overlapped with measurement gap (TSMTCperiod < MGRP)

- Psharing factor = 1, if the candidate beam detection RS outside measurement gap is

- not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and;

- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.

- Psharing factor = 3, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of *smtc2* is present, TSMTCperiod follows *smtc2*; Otherwise TSMTCperiod follows *smtc1*. TSMTCperiod is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for CBD and SMTC means that CSI-RS for CBD is within the SMTC window duration.

Longer evaluation period would be expected if the combination of the CBD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

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=======================fifth change request (R4-2118791) =========================

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 overlapping with the PDSCH 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.

==========================sixth change request (R4-2118791) ============================

### 8.10A.5 RRC based TCI state switch delay

If the target TCI state is known, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+ (TRRC\_processing  +TOk\*(Tfirst-SSB + TSSB-proc+ TSSB\*LRRC,known)) / *NR slot length*. The UE is not required to receive PDCCH/PDSCH/CSI-RS or transmit PUCCH/PUSCH until the end of switching period.

Where

- Slot n is last slot overlapping with the PDSCH carrying RRC activation command.

- TRRC\_processing is the RRC processing delay defined in Clause 11.2 of 36.331 [16] is the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in Clause 12 of TS38.331 [2]

- Tfirst-SSB is time to first SSB transmission occasion after RRC processing by the UE, during which some of the SSB occasions may not be availabledue to DL CCA failures;

- The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state;

- LRRC,known≤ LRRC,known,max is the corresponding number of SSB occasions not available at the UE;

- LRRC,known,max =2 for TSSB ≤ 40 ms, LRRC,known,max =1 for TSSB>40 ms.

- TSSB-proc, TOk, and TSSB are as defined in clause 8.10A.3.

If the target TCI state is unknown, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+ (TRRC\_processing  +TOuk\*(Tfirst-SSB+ TSSB-proc+TSSB\*LRRC,unknown) ) / *NR slot length*. The UE is not required to receive PDCCH/PDSCH/CSI-RS or transmit PUCCH/PUSCH until the end of switching period.

Where,

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command.

- TRRC\_processing is the RRC processing delay defined in Clause 11.2 of 36.331 [16] is the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in Clause 12 of TS38.331 [2].

- Tfirst-SSB is time to first SSB transmission occasion after RRC processing time at the, during which some SSB occasions may not be available at the UE due to DL CCA failures;

- The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state;

- LRRC,unknown≤LRRC,unknown,max is the corresponding number of SSB occasions not available at the UE;

- LRRC,unknown,max = 2 for TSSB ≤40 ms, LRRC,unknown,max = 1 for TSSB>40 ms.

- TOuk, TSSB-proc, and TSSB are as defined in clause 8.10A.3

The requirements for RRC based TCI state switch delay apply when only 1 TCI state is configured in RRC TCI state list. When a longer switching delay is allowed. Where is the time between DL data transmission and acknowledgement as specified in TS 38.213 [3].

==========================seventh change request (R4-2118791) ============================

### 8.11B.2 Conditoinal PSCell Change delay

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

The UE shall be capable to transmit PRACH preamble towards the new target PSCell no later than in slot *n* + Tconfig\_PSCell\_Conditional:

Where:

- Slot n is the last slot overlapping with the PDSCH containing conditional PSCell change.

- Tconfig\_PSCell\_Conditional = TRRC\_delay + TEvent\_DU + Tmeasure + TUE\_preparation + Tprocessing + T∆ + TPSCell\_ DU + 2 ms

- TRRC\_delay is the RRC processing delay defined in Clause 11.2 in 36.331 [16] is the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC procedure delay defined in clause 12 in TS 38.331 [2] for processing the conditional PSCell change command.

- TEvent\_DU is the delay uncertainty which is the time from when the UE successfully decodes a conditional PSCell change command until a condition exists at the measurement reference point which will trigger the conditional PSCell change.

- Tmeasure is the measurements time stated in clause 8.11B.2.1.

- TUE\_preparation is the UE preparation time for conditional PSCell change, and starts after UE realizes the condition of PSCell change is met and identity of new PSCell is determined. TUE\_preparation is up to 10ms.

- Tprocessing is the SW processing time needed by UE, including RF warm up period. Tprocessing = 20 ms when source and target cells are in the same FR, and Tprocessing = 40 ms when source and target cells are in different FRs.

- T∆ is time for fine time tracking and acquiring full timing information of the target cell. T∆ = 1\*Trs ms.

-

- TPSCell\_ DU is the delay uncertainty in acquiring the first available PRACH occasion in the PSCell. TPSCell\_ DU is up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in Table 8.1-1 of TS 38.213 [3].

The PCell interruption specified in clause 8.2 is allowed only after the UE starts to execute a conditional PSCell change.

==========================eighth change request (R4-2118791) ============================

### 8.12.5 RRC based spatial relation switch delay

If the target spatial relation associated to DL RS is known, UE shall be able to transmit target periodic SRS with spatial relation of the serving cell on which periodic SRS with spatial relation reconfigured in the slot n+ TRRC\_processing /*NR slot length* +1 when *beamCorrespondenceWithoutUL-BeamSweeping* is set to 1.

Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command,

- TRRC\_processing is the RRC processing delay defined in 36.331 [16] is the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in TS38.331 [2].

If the target spatial relation associated to DL RS is unknown, UE shall be able to transmit target periodic SRS with spatial relation of the serving cell on which periodic SRS with spatial relation reconfigured in the slot n+ TRRC\_processing /*NR slot length* + TL1-RSRP +1 when *beamCorrespondenceWithoutUL-BeamSweeping* is set to 1.

Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command,

- TRRC\_processing is the RRC processing delay defined in 36.331 [16] is the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in TS38.331 [2].

- TL1-RSRP is defined in clause 8.12.3

==========================ninth change request (R4-2118791) ============================

### 8.13.2 UE-specific CBW change delay

After the UE receives RRC reconfiguration involving *offsetToCarrier* or *carrierBandwidth* change on the old CBW, UE shall be able to receive PDSCH/PDCCH on an active DL BWP or transmit PUSCH on an active UL BWP of the new CBW right after a time duration of slots which begins from the beginning of DL slot n, where

DL slot n is the last slot overlapping with the PDSCH containing the RRC command, and

is the length of the RRC procedure delay in millisecond as defined in clause 11.2 in TS 36.331 [6] is the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the length of the RRC procedure delay in millisecond as defined in clause 12 in TS 38.331 [2], and

is the time used by the UE to perform CBW change.

The UE is not required to transmit UL signals or receive DL signals during the above defined time duration on the cell where UE-specific CBW change occurs. When a longer switching delay is allowed. Where is the time between DL data transmission and acknowledgement as specified in TS 38.213 [3].

<End of Change 4>

<Start of Change 5-CR R4-2117342 and R4-2118925>

==========================first change request (R4-2118925) =============================

### 9.1.5 Carrier-specific scaling factor

This clause specifies the derivation of carrier-specific scaling factor (CSSF) values, which scales the measurement delay requirements given in clause 9.2, 9.2A, 9.3, 9.3A 9.4, and NR PRS-based positioning measurements in clause 9.9 and CSI-RS based L3 measurement in clause 9.10 when UE is configured to monitor multiple measurement objects. The CSSF values are categorized into CSSFoutside\_gap,i andCSSFwithin\_gap,i, for the measurements conducted outside measurement gaps and within measurement gaps, respectively.

#### 9.1.5.1 Monitoring of multiple layers outside gaps

The carrier-specific scaling factor CSSFoutside\_gap,i for measurement object *i* derived in this chapter is applied to following measurement types:

- SSB-based intra-frequency measurement with no measurement gap in clause 9.2.5 and 9.2A.5, when none of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

- SSB-based intra-frequency measurement with no measurement gap in clause 9.2.5 and 9.2A.5, when part of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

- For a UE in E-UTRA-NR dual connectivity operation, NR SSB-based inter-RAT measurement object configured by the E-UTRAN PCell on an NR serving carrier

- the SSB is completely contained in the active BWP of the UE, and

- none or part of the SMTC occasions of this inter-RAT measurement object are overlapped by the measurement gap;

- CSI-RS based intra-frequency measurement in clause 9.10.2, when none of CSI-RS resources for L3 measurement of this intra-frequency measurement object are overlapped by the measurement gap.

- CSI-RS based intra-frequency measurement in clause 9.10.2, when all CSI-RS resources for L3 measurement of this intra-frequency measurement object are partially overlapped by the measurement gap.- SSB-based inter-frequency measurement with no measurement gap in clause 9.3.9, when none of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, if UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the Network.

SSB-based inter-frequency measurement with no measurement gap in clause 9.3.9, when part of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, if it is a CA capable UE and this UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the Network.

- Intra-frequency RSSI and channel occupancy measurement with no measurement gap on a carrier subject to CCA when SMTC and RMTC are overlapping and RMTCs are not fully overlapped with measurement gap.

For a UE in E-UTRA-NR dual connectivity operation, if a measurement object configured by PSCell and an NR inter-RAT measurment object configured by E-UTRAN PCell are on the same serving carrier, they shall be counted as one intra-frequency measurement object, provided that they meet the measurement object merging conditions [in clause 9.1.3.2].

The number of frequency layers for SSB measurements shall include the total number of MOs with

- *ssb-ConfigMobility* configured, or

- *ssb-ConfigMobility* not configured but *csi-rs-ResourceConfigMobility* configured with *associatedSSB*.

If *ssbfrequency, smtc1, smtc2* and *ssbSubcarrierSpacing* are same in multiple MOs, the multiple MOs are counted as one SSB frequency layer.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSFoutside\_gap,i and requirements derived from CSSFoutside\_gap,i are not specified.

The UE cell identification and measurement periods derived based on CSSFoutside\_gap,i in clauses 9.2.5.1, 9.2.5.2 and 9.10.2 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with Tmeasure\_SFTD1 specified in clause 9.3.8 when no measurement gaps are provided.

The requirements in this clause apply provided that

- There are no PCell nor PSCell in FR2, or

- The SMTC on all CCs and inter-frequency layers without measurement gap in FR2 have the same offset, and one of following conditions is met

- If *smtc2* is configured on any FR2 CC,

- All CCs have the same configuration for *smtc1*, and

- All CCs configured with *smtc2* have the same configuration for *smtc2*

- If *smtc2* is not configured on any FR2 CC,

- The total number of different SMTC periodicities on all serving CCs and inter-frequency layers without measurement gap does not exceed 4

- The starting point of the first 5ms window for CSI-RS measurement as defined in clause 9.10.1 on all CCs in FR2 is same and one of following conditions is met

- If any CSI-RS resource is configured in the second 5ms window for CSI-RS measurement as defined in clause 9.10.1 on any FR2 CC,

- All CCs with CSI-RS resources only in the first 5ms window have the same CSI-RS resource periodcity, and

- All CCs with CSI-RS resources both in the first and the second 5ms window have the same CSI-RS resource periodcity

- If no CSI-RS resource is configured in the second 5ms window for CSI-RS measurement as defined in clause 9.10.1 on any FR2 CC,

- The total number of different CSI-RS resources periodicities on all serving CCs does not exceed 3

Note: Longer delays for cell identification and measurement periods derived based on CSSFoutside\_gap,i in clauses 9.2.5.1, 9.2.5.2, can be expected, if the UE is configured with more than 4 different SMTC periodicities on FR2 serving carriers. The longer delay applies for the FR2 intra-frequency measurement objects with the longest SMTC periodicity/periodicities.

==========================second change request (R4-2117342) =============================

#### 9.1.5.2 Monitoring of multiple layers within gaps

The carrier-specific scaling factor CSSFwithin\_gap,i for a measurement object *i* derived in this chapter is applied to following measurement types:

- SSB-based intra-frequency measurement object with no measurement gap in clause 9.2.5 and 9.2A.5, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

- SSB-based intra-frequency measurement object with measurement gap in clause 9.2.6 and 9.2A.6.

-- CSI-RS based inter-frequency measurement in clause 9.10.3, when CSI-RS resources for L3 measurement of this inter-frequency measurement object are overlapped by the measurement gap.

- CSI-RS based inter-frequency measurement in clause 9.10.3, when CSI-RS resources for L3 measurement of this inter-frequency measurement object are partially overlapped by the measurement gap.

- SSB-based inter-frequency measurement object with measurement gap in clause 9.3.4.

- SSB-based inter-frequency measurement object without measurement gap for UE capable of *interFrequencyMeas-NoGap* in clause 9.3.9, when

- all of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, or

- part of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, and the flag *interFrequencyConfig-NoGap-r16* is configured by the Network but it is not a CA capable UE, or

- part of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, but the flag *interFrequencyConfig-NoGap-r16* is not configured by the Network.

- Intra-frequency RSSI/CO measurement with measurement gap in clause 9.2A.7.

- Intra-frequency RSSI/CO measurement with no measurement gap in clause 9.2A.7 when all of the RMTC occasions of this intra-frequency RSSI/CO measurement are overlapped by the measurement gap

- Inter-frequency RSSI/CO measurement in clause 9.3A.8 and 9.3A.9.

- E-UTRA Inter-RAT measurement object in clauses 9.4.2 and 9.4.3.

-- For a UE in E-UTRA-NR dual connectivity operation, NR SSB-based Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR serving carrier

- the SSB is not completely contained in the active BWP of the UE, or

- all of the SMTC occasions of this inter-RAT measurement object are overlapped by the measurement gap;

- NR SSB-based Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR non-serving carrier.

- E-UTRAN Inter-frequency measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.3) and by the E-UTRAN PSCell (TS 36.133 [15] clause 8.19.3).

- E-UTRAN Inter-frequency RSTD measurement configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.15).

- UTRA Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.5 to 8.17.12).

- GSM Inter-RAT measurements configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.13 and 8.17.14).

UE is expected to conduct the measurement of this measurement object *i* only within the measurement gaps.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSFwithin\_gap,i and requirements derived from CSSFoutside\_gap,i are not specified.

Number of SSB layers should include SSB for mobility and that as associated SSB for CSI-RS mobility. The ssbfrequency is counted only once if the ssbfrequency for mobility and associated SSB are the same, or ssbfrequency and smtc in multiple MOs are the same.

SSB-based measurement and CSI-RS based measurement for mobility configured in the same measurement object are considered as different layers.

<End of Change 5>

<Start of Change 6-CR R4-2119345 and R4-2118405>

==========================first change request (R4-2119345) =============================

#### 9.2.5.3 Scheduling availability of UE during intra-frequency measurements

UE shall be capable of measuring without measurement gaps when the SSB is completely contained in the active bandwidth part of the UE. When any of the conditions in the following clauses is met, there are restrictions on the scheduling availability; otherwise, there is no scheduling restriction. Note that the SSB symbols indicated by the union set of *SSB-ToMeasure* from all the configured measurement objects on the same serving carrier which can be merged[2], if it is configured; otherwise, all *L* SSB symbols within the SMTC window duration defined in clause 4.1 of TS 38.213 [3] are included.

##### 9.2.5.3.1 Scheduling availability of UE performing measurements in TDD bands on FR1

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRP or SS-SINR measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer in TS 38.331 [2] signalling of *smtc2*is configured, the SMTC periodicityfollows *smtc2*; Otherwise SMTC periodicity follows *smtc1.*

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRQ measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration. If the high layer signalling of *smtc2*is configured in TS 38.331 [2], the SMTC periodicityfollows *smtc2*; Otherwise the SMTC periodicity follows *smtc1.*

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

When TDD inter-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to another serving cell in a different band on the symbols that fully or partially overlap with the aforementioned restricted symbols, if UE does not have the capability of supporting *simultaneousRxTxInterBandCA* for this band pair.

##### 9.2.5.3.2 Scheduling availability of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to SS-RSRP/RSRQ/SINR measurement

- If *deriveSSB\_IndexFromCell* is enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer signalling of *smtc2*is configured(in TS 38.331 [2]), the SMTC periodicityfollows *smtc2*; Otherwise the SMTC periodicity follows *smtc1.*

- If *deriveSSB\_IndexFromCell* is not enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on all symbols within SMTC window duration. If the high layer signalling of *smtc2*is configured in TS 38.331 [2], the SMTC periodicityfollows *smtc2*; Otherwise the SMTC periodicity follows *smtc1.*

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

##### 9.2.5.3.3 Scheduling availability of UE performing measurements on FR2

The following scheduling restriction applies due to SS-RSRP or SS-SINR measurement on an FR2 intra-frequency cell

The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration (The signaling *deriveSSB\_IndexFromCell* is always enabled for FR2). If the high layer signalling of *smtc2*is configured in TS 38.331 [2], the SMTC periodicityfollows *smtc2*; Otherwise the SMTC periodicity follows *smtc1.*

The following scheduling restriction applies to SS-RSRQ measurement on an FR2 intra-frequency cell

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration (The signaling *deriveSSB\_IndexFromCellc* is always enabled for FR2). If the high layer signalling of *smtc2*is configured in TS 38.331 [2], the SMTC periodicityfollows *smtc2*; Otherwise the SMTC periodicity follows *smtc1.*

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

When inter-band carrier aggregation in FR2 is performed, there are no scheduling restrictions on FR2 serving cells in the bands due to SS-RSRP, SS-RSRQ or SS-SINR measurement on an FR2 intra-frequency cell in different bands, provided that UE is capable of independent beam management on this FR2 band pair. Additionally, there is no scheduling restriction if the UE is configured with different numerology between SSB on one FR2 band and data on the other FR2 band provided the UE is configured for IBM operation for the band pair.

Note: When inter-band carrier aggregation in FR2 is performed, the scheduling restrictions as defined in clause 9.2.5.3.1 due to a given serving cell should also apply to another serving cell in a different FR2 band on the symbols that fully or partially overlap with the aforementioned restricted symbols, if UE does not have the capability of supporting *simultaneousRxTxInterBandCA* for this FR2 band pair.

If following conditions are met:

- The UE has been notified about system information update through paging,

- The gap between the UE’s reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, the UE is expected to receive the PDCCH that the UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, the UE is expected to receive PDSCH that corresponds to the PDCCH that the UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured.

##### 9.2.5.3.4 Scheduling availability of UE performing measurements on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) due to measurements performed on FR2 serving cell frequency layer. However, the scheduling restrictions as defined in clause 9.2.5.3.1 due to a given serving cell in FR2 should also apply to another serving cell in an FR1 band on the symbols that fully or partially overlap with the aforementioned restricted symbols, if UE does not have the capability of supporting *simultaneousRxTxInterBandCA* for this FR1-FR2 band pair.

There are no scheduling restrictions on FR2 serving cell(s) due to measurements performed on FR1 serving cell frequency layer. However, the scheduling restrictions as defined in clause 9.2.5.3.1 due to a given serving cell in FR1 should also apply to another serving cell in an FR2 band on the symbols that fully or partially overlap with the aforementioned restricted symbols, if UE does not have the capability of supporting *simultaneousRxTxInterBandCA* for this FR1-FR2 band pair.

==========================second change request (R4-2118405) =============================

### 9.5.4 L1-RSRP measurement requirements

#### 9.5.4.1 SSB based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured SSB resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of TL1-RSRP\_Measurement\_Period\_SSB.

The value of TL1-RSRP\_Measurement\_Period\_SSB is defined in Table 9.5.4.1-1 for FR1 and Table 9.5.4.1-2 for FR2, where

- M=1 if higher layer parameter *timeRestrictionForChannelMeasurement* is configured, and M=3 otherwise

- N= 8.

For FR1,

- P=, when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and

- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- P=, when SSB is not overlapped with measurement gap and SSB is partially overlapped with SMTC occasion (TSSB < TSMTCperiod).

- P is Psharing factor, when SSB is not overlapped with measurement gap and SSB is fully overlapped with SMTC period (TSSB = TSMTCperiod).

- P=, when SSB is partially overlapped with measurement gap and SSB is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and

- TSMTCperiod ≠ MGRP or

- TSMTCperiod = MGRP and TSSB < 0.5\*TSMTCperiod

- P is \* Psharing factor, when SSB is partially overlapped with measurement gap and SSB is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TSSB = 0.5\*TSMTCperiod

- P=, when SSB is partially overlapped with measurement gap (TSSB <MGRP) and SSB is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap.

- P is \* Psharing factor, when SSB is partially overlapped with measurement gap and SSB is fully overlapped with SMTC occasion (TSSB = TSMTCperiod) and SMTC occasion is partially overlapped with measurement gap (TSMTCperiod < MGRP)

- P is \* Psharing factor, when SSB is partially overlapped with measurement gap and SSB is fully overlapped with SMTC occasion (TSSB = TSMTCperiod) and SMTC occasion is partially overlapped with measurement gap (TSMTCperiod < MGRP)Psharing factor = 1

- not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and,

- not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured,

- Psharing factor = 3, otherwise.

Where:

TSSB = ssb-periodicityServingCell

TSMTCperiod = the configured SMTC period

If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, TSMTCperiod corresponds to the value of higher layer parameter *smtc2*; Otherwise TSMTCperiod corresponds to the value of higher layer parameter *smtc1*. TSMTCperiod is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Longer evaluation period would be expected if the combination of SSB, SMTC occasion and measurement gap configurations does not meet pervious conditions.

**Table 9.5.4.1-1: Measurement period TL1-RSRP\_Measurement\_Period\_SSB for FR1**

|  |  |
| --- | --- |
| **Configuration** | **TL1-RSRP\_Measurement\_Period\_SSB (ms)** |
| non-DRX | max(TReport, ceil(M\*P)\*TSSB) |
| DRX cycle ≤ 320ms | max(TReport, ceil(1.5\*M\*P)\*max(TDRX,TSSB)) |
| DRX cycle > 320ms | ceil(M\*P)\*TDRX |
| Note: TSSB = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-RSRP measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting. | |

**Table 9.5.4.1-2: Measurement period TL1-RSRP\_Measurement\_Period\_SSB for FR2**

|  |  |
| --- | --- |
| **Configuration** | **TL1-RSRP\_Measurement\_Period\_SSB (ms)** |
| non-DRX | max(TReport, ceil(M\*P\*N)\*TSSB) |
| DRX cycle ≤ 320ms | max(TReport, ceil(1.5\*M\*P\*N)\*max(TDRX,TSSB)) |
| DRX cycle > 320ms | ceil(1.5\*M\*P\*N)\*TDRX |
| Note: TSSB = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-RSRP measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting. | |

#### 9.5.4.2 CSI-RS based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured CSI-RS resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of TL1-RSRP\_Measurement\_Period\_CSI-RS.

The value of TL1-RSRP\_Measurement\_Period\_CSI-RS is defined in Table 9.5.4.2-1 for FR1 and in Table 9.5.4.2-2 for FR2, where

- For periodic and semi-persistent CSI-RS resources, M=1 if higher layer parameter *timeRestrictionForChannelMeasurement* is configured, and M=3 otherwise

- For aperiodic CSI-RS resources M=1

- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / Nres\_per\_set), where Nres\_per\_set is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for all resources in the resource set.

- SSB for L1-RSRP measurement, or

- another CSI-RS in resource set configured with repetition ON.

- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / Nres\_per\_set), where Nres\_per\_set is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for with QCL-TypeD all resources in the resource set.

- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set and for each resource one RS has QCL-TypeD with

- SSB for L1-RSRP measurement, or

- another CSI-RS in resource set configured with repetition ON.

- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / Nres\_per\_set), where Nres\_per\_set is number of resources in the resource set. The requirements apply provided TCI state is provided with QCL-TypeD for all resources in the resource set in the MAC CE activating the resource set.

- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided *qcl-info* is configured for all resources in the resource set and for each resource one RS has QCL-TypeD with

- SSB for L1-RSRP measurement, or

- another CSI-RS in resource set configured with repetition ON.

- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=1. UE is not required to meet the accuracy requirements in clause 10.1.19.2 and 10.1.20.2 if number of resources in the resource set is smaller than *maxNumberRxBeam*. The requirements apply provided *qcl-info* is configured with QCL-TypeD for all resources in the resource set.

For FR1,

- P=, when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and

- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P=1, when CSI-RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.

- P=, when CSI-RS is partially overlapped with measurement gap and CSI-RS is not overlapped with SMTC occasion (TCSI-RS < MGRP)

- P=, when CSI-RS is not overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod).

- P=Psharing factor, when CSI-RS is not overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod).

- P=1, when aperiodic CSI-RS resource is not overlapped with measurement gap.

- P=, when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and

- TSMTCperiod ≠ MGRP or

- TSMTCperiod = MGRP and TCSI-RS < 0.5\*TSMTCperiod

- P=, when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TCSI-RS = 0.5\*TSMTCperiod

- P=, when CSI-RS is partially overlapped with measurement gap (TCSI-RS < MGRP) and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is partially or fully overlapped with measurement gap.

- P=, when CSI-RS is partially overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod) and SMTC occasion is partially overlapped with measurement gap (TSMTCperiod < MGRP)

- Psharing factor = 1, if the CSI-RS configured for L1-RSRP measurement outside measurement gap is

- not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and,

- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured

- Psharing factor = 3, otherwise.

Where:

TSMTCperiod = the configured SMTC period.

TCSI-RS = the periodicity of CSI-RS configured for L1-RSRP measurement

If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, TSMTCperiod corresponds to the value of higher layer parameter *smtc2*; Otherwise TSMTCperiod corresponds to the value of higher layer parameter *smtc1*. TSMTCperiod is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for L1-RSRP measurement and SMTC means that CSI-RS for L1-RSRP measurement is within the SMTC window duration.

Longer evaluation period would be expected if the combination of CSI-RS, SMTC occasion and measurement gap configurations does not meet pervious conditions.

**Table 9.5.4.2-1: Measurement period TL1-RSRP\_Measurement\_Period\_CSI-RS for FR1**

|  |  |
| --- | --- |
| **Configuration** | **TL1-RSRP\_Measurement\_Period\_CSI-RS (ms)** |
| non-DRX | max(TReport, ceil(M\*P)\*TCSI-RS) |
| DRX cycle ≤ 320ms | max(TReport, ceil(1.5\*M\*P)\*max(TDRX,TCSI-RS)) |
| DRX cycle > 320ms | ceil(M\*P)\*TDRX |
| Note 1: TCSI-RS is the periodicity of CSI-RS configured for L1-RSRP measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting.  Note 2: the requirements are applicable provided that the CSI-RS resource configured for L1-RSRP measurement is transmitted with Density = 3. | |

**Table 9.5.4.2-2: Measurement period TL1-RSRP\_Measurement\_Period\_CSI-RS for FR2**

|  |  |
| --- | --- |
| **Configuration** | **TL1-RSRP\_Measurement\_Period\_CSI-RS (ms)** |
| non-DRX | max(TReport, ceil(M\*P\*N)\*TCSI-RS) |
| DRX cycle ≤ 320ms | max(TReport, ceil(1.5\*M\*P\*N)\*max(TDRX,TCSI-RS)) |
| DRX cycle > 320ms | ceil(M\*P\*N)\*TDRX |
| Note 1: TCSI-RS is the periodicity of CSI-RS configured for L1-RSRP measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting.  Note 2: the requirements are applicable provided that the CSI-RS resource configured for L1-RSRP measurement is transmitted with Density = 3. | |

<End of Change 6>

<Start of Change 7-CR R4-2117342 and R4-2118422>

==========================first change request (R4-2118422) =============================

#### 9.10.2.2 Requirements applicability

The measurement of the associated SSB follows the same requirements as SSB based measurements defined in 9.2.

The requirements in clause 9.10.2 apply, provided:

- Only one intra-frequency CSI-RS layer per serving cell is configured, and

- The BW of the CSI-RS on the intra-frequency neighbor cell is within the active BWP of the UE, and

- The associated SSB of the CSI-RS resources being identified or measured are detectable, and the CSI-RS resources configured for CSI-RS based L3 measurements are measurable, and

- The bandwidth of CSI-RS resources of intra-MO is the same as that of the CSI-RS resources configured for the serving cell, and

- All CSI-RS resources on one intra-frequency layer are configured within up to two separate windows where each window is up to 5ms, and

* for the case of single window further provided

- The periodicity of the configured CSI-RS resources is 10ms, 20ms or 40ms

* for the case of two separate windows further provided

- The two windows are either both fully non-overlapped with MG or both partially overlapped with MG

- The periodicity of the configured CSI-RS resources is 20ms or 40ms

- The starting point of the first window is the slot boundary of the serving cell, where the corresponding slot contains the configured L3 CSI-RS resource of the serving cell in the servingCellMO with the smallest offset, and

- The starting point of the second window if configured is determined by an offset of half of the CSI-RS periodicity in slots with regards to the starting point of the first window, and

- Numerology for intra-frequency CSI-RS and data of serving cell are the same.

An intra-frequency cell shall be considered detectable when for each relevant associated SSB:

SS-RSRP related side conditions given in clauses 10.1.2.1 and 10.1.3.1 for FR1 and FR2, respectively, for a corresponding Band,

- SS-RSRQ related side conditions given in clauses 10.1.7.1 and 10.1.8.1 for FR1 and FR2, respectively, for a corresponding Band,

- SS-SINR related side conditions given in clauses 10.1.12.1 and 10.1.13.1 for FR1 and FR2, respectively, for a corresponding Band,

- SSB\_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding Band.

A CSI-RS resource shall be considered measurable when for each relevant CSI-RS resource:

- CSI-RSRP related side conditions given in clauses 10.1.2.3 and 10.1.3.3 for FR1 and FR2, respectively, for a corresponding Band,

- CSI-RSRQ related side conditions given in clauses 10.1.7.2 and 10.1.8.2 for FR1 and FR2, respectively, for a corresponding Band,

- CSI-SINR related side conditions given in clauses 10.1.12.2 and 10.1.13.2 for FR1 and FR2, respectively, for a corresponding Band,

- CSI\_RP and CSI-RS Ês/Iot according to Annex B.2.12 for a corresponding Band.

==========================second change request (R4-2118422) =============================

#### 9.10.2.5 Intra-frequency measurements without measurement gaps

If a UE is configured with the higher layer parameters *CSI-RS-Resource-Mobility* and *associatedSSB*, the CSI-RS based measurement shall include PSS/SSS detection time of associatedSSB, the time period used to acquire the SFN information and CSI-RS based measurement period without gap.

PSS/SSS detection time of associatedSSB is the intra-frequency TPSS/SSS\_sync\_intra in Clause 9.2.5.1.

The time period used to acquire the SFN information is TCSI-RS\_SFN\_intra as shown in Table 9.10.2.5-3 for FR1 and is the same as the intra-frequency TSSB\_time\_index\_intra in Clause 9.2.5.1 for FR2. If the UE is indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled), the time period is equal to 0. It is assumed that deriveSSB-IndexFromCell is always enabled for FR1 TDD and FR2.If the associatedSSB, which has been detectable at least for the time period Tidentify\_intra\_with\_index defined in clause 9.2.5.1, becomes undetectable for a period ≤ 5 seconds and then the associatedSSB becomes detectable again with the same spatial reception parameter provided the timing to that cell has not changed more than  3200 Tc, PSS/SSS detection time and time period used to acquire the SFN information are equal to 0.

The measurement period for CSI-RS based intra-frequency measurements without gaps is as shown in table 9.10.2.5-1and Table 9.10.2.5-2.

Additionally, for a given CSI-RS resource, if the associated SS/PBCH block is configured but not detected by the UE, or if CSI-RS is configured with associated SSB but not QCL-ed to the associated SSB, the UE is not required to monitor the corresponding CSI-RS resource.

Table 9.10.2.5-1: Measurement period for intra-frequency CSI-RS based measurements without gaps (FR1)

|  |  |
| --- | --- |
| DRX cycle | T CSI-RS\_measurement\_period\_intra |
| No DRX | max(200ms, ceil( 5 x Kp\_CSI-RS) x CSI-RS period) x CSSFintra |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5x 5 x Kp\_CSI-RS) x max(CSI-RS period, DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil( 5 x Kp\_CSI-RS) x DRX cycle x CSSFintra |
| NOTE 1: The requirements apply assuming CSI-RS configuration with {D=3 with PRBs ≥ 48}. D is frequency domain density for the 1-port CSI-RS for L3 mobility defined in clause 7.4.1 of TS38.211 [6]. | |

Table 9.10.2.5-2: Measurement period for intra-frequency CSI-RS based measurements without gaps (FR2)

|  |  |
| --- | --- |
| DRX cycle | T CSI-RS\_measurement\_period\_intra |
| No DRX | max(400ms, ceil(Mmeas\_period\_w/o\_gaps x Kp\_CSI-RS) x CSI-RS period) x CSSFintra |
| DRX cycle≤ 320ms | max(400ms, ceil(1.5x Mmeas\_period\_w/o\_gaps x Kp\_CSI-RS) x max(CSI-RS period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Mmeas\_period\_w/o\_gaps x DRX cycle x CSSFintra |
| NOTE 1: The requirements apply assuming CSI-RS configuration with {D=3 with PRBs ≥ 48}. D is frequency domain density for the 1-port CSI-RS for L3 mobility defined in clause 7.4.1 of TS38.211 [6]. | |

Table 9.10.2.5-3: Time period for SFN acquisition for intra-frequency CSI-RS based measurements without gaps(FR1)

|  |  |
| --- | --- |
| DRX cycle | TCSI-RS\_SFN\_intra |
| No DRX | max(200ms, ceil(5 x Kp )x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(2000ms, ceil (1.5 x 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 | |

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

CSSFintra: it is a carrier specific scaling factor and is determined according to CSSFoutside\_gap,i in clause 9.1.5.

- if intra-frequency CSI-RS resource is fully non overlapping with measurement gaps, Kp\_CSI-RS=1;

- if intra-frequency CSI-RS resource is partially overlapping with measurement gaps, Kp\_CSI-RS = 1/(1- (CSI-RS resource period /MGRP)), where CSI-RS resource period < MGRP.

==========================third change request (R4-2117342) =============================

#### 9.10.3.5 Inter frequency measurements with measurement gaps

When measurement gaps are provided, if configured with the higher layer parameters *CSI-RS-Resource-Mobility* and *associatedSSB,* the UE shall be able to identify a new detectable CSI-RS based inter frequency cell within T CSI-RS\_identify\_inter,

T CSI-RS\_identify\_inter = (TPSS/SSS\_sync + T CSI-RS\_measurement\_period\_inter + TCSI-RS\_SFN\_inter) ms

Where:

TPSS/SSS\_sync is the time period used in PSS/SSS detection which is determined according to TPSS/SSS\_sync\_inter in clause9.3.4,

TCSI-RS\_SFN\_inter is the time period used to acquire the SFN information of the cell being measured, which is shown in Table 9.10.3.5-3 for FR1 and equals inter-frequency TSSB\_time\_index\_inter in Clause 9.3.4 for FR2,

TCSI-RS\_measurement\_period\_inter: equal to a measurement period of CSI-RS based measurement given in table 9.10.3.5-1 and table 9.10.3.5-2.

Mmeas\_period\_inter: For a UE supporting FR2 power class 1, Mmeas\_period\_inter =8×N samples. For a UE supporting FR2 power class 2, Mmeas\_period\_inter=5×N samples. For a UE supporting FR2 power class 3, Mmeas\_period\_inter =5×N samples. For a UE supporting FR2 power class 4, Mmeas\_period\_inter = 5×N samples. Note that scaling factor N = [8]. CSSFinter: it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in clause 9.1.5 for measurement conducted within measurement gaps.

Additionally, for a given CSI-RS resource, if the associated SSB is configured but not detected by the UE, or if CSI-RS configured with associated SSB but not QCL-ed to the associated SSB, the UE is not required to monitor the corresponding CSI-RS resource.

Table 9.10.3.5-1: Measurement period for CSI-RS based inter-frequency measurements with gaps (FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T CSI-RS\_measurement\_period\_inter |
| No DRX | Max(200ms, 8 × Max(MGRP, CSI-RS period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(200ms, Ceil(8 × 1.5) × Max(MGRP, CSI-RS period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | 8 × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

Table 9.10.3.5-2: Measurement period for CSI-RS based inter-frequency measurements with gaps (FR2)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T CSI-RS\_measurement\_period\_inter |
| No DRX | Max(400 ms, Mmeas\_period\_inter × Max(MGRP, CSI-RS period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(400 ms, (1.5 × Mmeas\_period\_inter) × Max(MGRP, CSI-RS period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | Mmeas\_period\_inter × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

Table 9.10.3.5-3: Time period for SFN acuisition for interfrequency CSI-RS based measurements with gaps(FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T CSI-RS\_SFN\_inter |
| No DRX | Max(200ms, 5 × Max(MGRP, SMTC period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(200ms, Ceil(5 × 1.5) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | 5 × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

<End of Change 7>

<Start of Change 8-CR R4-2120257>

==========================first change request (R4-2120257) =============================

A.4.5.6.5 SCell dormancy switch

A.4.5.6.5.1 E-UTRAN – NR FR1 PSCell SCell dormancy switch of single FR1 SCell outside active time

###### A.4.5.6.5.1.1 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.4.5.6.5.1.1-1.

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.4.5.6.5.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCell are specified in Table A.4.5.6.5.1.1-3 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.4.5.6.5.1.1-1: 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.4.5.6.5.2 can skip the test cases in current clause A.4.5.6.5.1.  Note 3: NR configuration is the same for PSCell and SCells. | |

Table A.4.5.6.5.1.1-2: 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.4.5.6.5.1.1-3: 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.4.5.6.5.1.2 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.4.5.6.5.2 E-UTRAN – NR FR1 PSCell SCell dormancy switch of two FR1 SCells inside active time

###### A.4.5.6.5.2.1 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.4.5.6.5.2.1-1.

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.4.5.6.5.2.1-2. 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.4.5.6.5.2.1-3 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.4.5.6.5.2.1-1: 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.4.5.6.5.2 can skip the test cases in clause A.4.5.6.5.1.  Note 3: NR configuration is the same for PSCell and SCells. | |

Table A.4.5.6.5.2.1-2: 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.4.5.6.5.2.1-3: 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.4.5.6.5.2.2 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.

==========================second change request (R4-2120257) =============================

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 | | | |

<End of Change 8>

<Start of Change 9-CR R4-2120393>

==========================first change request (R4-2120393) =============================

#### A.6.3.1.6 SA NR - UTRAN FDD handover

##### A.6.3.1.6.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT UTRAN FDD handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to UTRAN FDD handover requirements as specified in clause 6.1.2.2.1.

The test comprises of one NR carrier and one UTRA FDD carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT UTRAN FDD neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.6-1. General test parameters are provided in Table A.6.3.1.6-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.6-3 and A.6.3.1.6-4 respectively.

Table A.6.3.1.6-1: Supported test configurations for SA inter-RAT UTRAN FDD handover tests

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

Table A.6.3.1.6-2: General test parameters for SA inter-RAT UTRAN FDD handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR RF Channel Number | |  | 1 | 1 NR carrier frequency is used in the test |
| UTRA RF Channel Number | |  | 2 | 1 UTRAN carrier frequency is used in the test |
| Initial conditions | Active cell |  | Cell 1 | NR cell |
|  | Neighbouring cell |  | Cell 2 | UTRAN cell |
| Final condition | Active cell |  | Cell 2 |  |
| NR measurement quantity | |  | SS-RSRP |  |
| Inter-RAT (UTRAN FDD) measurement quantity | |  | CPICH Ec/N0 |  |
| b2-Threshold1 | | dBm | As specified in Table A.6.3.1.6-3 | Absolute NR SS-RSRP threshold for event B2 |
| b2-Threshold2UTRA-FDD | | dB | -18 | Absolute UTRAN CPICH Ec/Io threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 9.1.2-1 started before T2 starts |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |

Table A.6.3.1.6-3: Cell specific test parameters for SA inter-RAT UTRAN FDD handover (Cell 1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | |
|  | |  |  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2, 3 | 1 | | |
| Duplex mode | |  | 1 | FDD | | |
|  | |  | 2, 3 | TDD | | |
| TDD Configuration | |  | 2 | TDDConf.1.1 | | |
|  | |  | 3 | TDDConf.2.1 | | |
| BWchannel | | MHz | 1 | 10: NRB,c = 52 (FDD) | | |
|  | |  | 2 | 10: NRB,c = 52 (TDD) | | |
|  | |  | 3 | 40: NRB,c = 106 (TDD) | | |
| PDSCH reference measurement channel | |  | 1 | SR.1.1 FDD | | |
|  | |  | 2 | SR.1.1 TDD | | |
|  | |  | 3 | SR.2.1 TDD | | |
| CORSET reference channel | |  | 1 | CR.1.1 FDD | | |
|  | |  | 2 | CR.1.1 TDD | | |
|  | |  | 3 | CR.2.1 TDD | | |
| TRS configuration | |  | 1 | TRS.1.1 FDD | | |
|  | |  | 2 | TRS.1.1 TDD | | |
|  | |  | 3 | TRS.1.2 TDD | | |
| OCNG patternNote1 | |  | 1, 2, 3 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2, 3 | DLBWP.0.1 | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | |
| SMTC configuration | |  | 1, 2, 3 | SMTC.1 | | |
| SSB configuration | |  | 1, 2 | SSB.1 FR1 | | |
|  | |  | 3 | SSB.2 FR1 | | |
| b2-Threshold1 | | dBm | 1, 2 | -96 | | |
|  | |  | 3 | -93 | | |
| EPRE ratio of PSS to SSS | | dB | 1, 2, 3 | 0 | | |
| EPRE ratio of PBCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PBCH to PBCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDCCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |  |  |  | | |
| EPRE ratio of PDSCH\_DMRS to SSS | |  |  |  | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |  |  |  | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2, 3 | -100 | | |
| *Noc*Note2 | | dBm/SCS | 1, 2, | -100 | | |
|  | |  | 3 | -97 | | |
| Ês/Noc | | dB | 1, 2, 3 | 12 | -4 | -4 |
| Ês/IotNote3 | | dB | 1, 2, 3 | 12 | -4 | -4 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2 | -88 | -104 | -104 |
|  | |  | 3 | -85 | -101 | -101 |
| IoNote3 | | dBm/9.36 MHz | 1, 2 | -59.78 | -70.59 | -70.59 |
|  | | dBm/38.16 MHz | 3 | -53.68 | -64.49 | -64.49 |
| Propagation condition | |  | 1, 2, 3 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2, 3 | 1x2 Low | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

Table A.6.3.1.6-4: Cell specific test parameters for SA inter-RAT UTRAN FDD handover (Cell 2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 (UTRA) | | |
|  |  | T1 | T2 | T3 |
| UTRA RF Channel Number |  | 2 | | |
| CPICH\_Ec/Ior | dB | -10 | | |
| PCCPCH\_Ec/Ior | dB | -12 | | |
| SCH\_Ec/Ior | dB | -12 | | |
| PICH\_Ec/Ior | dB | -15 | | |
| DCH\_Ec/Ior | dB | N/A | N/A | Note 1 |
| OCNS\_Ec/Ior | dB | -0.941 | 0.941 | Note 2 |
|  | dB | ‑infinity | -1.8 | -1.8 |
|  | dBm/3,84 MHz | ‑70 | -70 | -70 |
| CPICH\_Ec/Io | dB | ‑infinity | -14 | -14 |
| Propagation Condition |  | AWGN | | |
| Note 1: The DPCH level is controlled by the power control loop  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior . | | | | |

##### A.6.3.1.6.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 190 ms from the beginning of time period T3.

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

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 50 ms, which is specified in clause 5.3.1.1.1.

Tinterrupt = 140 ms in the test; Tinterrupt is defined in clause 5.3.1.1.2. This gives a total of 190 ms.

==========================second change request (R4-2120393) =============================

#### A.6.6.5.1 SA NR - UTRAN FDD event-triggered reporting in non-DRX in FR1

##### A.6.6.5.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT UTRAN FDD measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clause 9.4.6.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT UTRAN FDD neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

Supported test configurations are shown in table A.6.6.5.1.1-1. General test parameters are provided in Table A.6.6.5.1.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.5.1.1-3 and A.6.6.5.1.1-4, respectively.

Table A.6.6.5.1.1-1: Supported test configurations in SA inter-RAT UTRAN FDD event triggered reporting in non-DRX with PCell in FR1

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

Table A.6.6.5.1.1-2: General test parameters for SA inter-RAT UTRAN FDD event triggered reporting in non-DRX with PCell in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | 1 NR carrier frequency is used in the test |
| UTRA RF Channel Number |  | 2 | 1 UTRA carrier frequency is used in the test |
| Channel Bandwidth | MHz | As specified in Tables A.6.6.5.1.1-3 and A.6.6.5.1.1-4. |  |
| Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Gap Pattern Id |  | 0 | As specified in Clause Table 9.1.2-1. Per-UE gap pattern. |
| Inter-RAT UTRA measurement quantity |  | CPICH Ec/Io | Measurement quantity for Cell 2 |
| b1-ThresholdUTRA-FDD | dB | -16.5 | CPICH Ec/Io threshold for SS-RSRP measurement on cell1 for event B1 |
| Hysteresis | dB | 0 |  |
| TimeToTrigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| DRX |  | OFF | OFF |
| T1 | s | 5 |  |
| T2 | s | 5 |  |
| Note 1: Values are defined in Table A.6.6.5.1.1-3 | | | |

Table A.6.6.5.1.1-3: PCell specific test parameters for SA inter-RAT UTRAN FDD event triggered reporting in non-DRX with PCell in FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Configuration | Cell 1 | |
|  | | |  |  | T1 | T2 |
| RF channel number | | |  | 1, 2, 3 | 1 | |
| Duplex mode | | |  | 1, 2, 3 | FDD | |
| TDD Configuration | | SCS=15 KHz |  | 2 | TDDConf.1.1 | |
|  | | SCS=30 KHz |  | 3 | TDDConf.2.1 | |
| BWchannel | | | MHz | 1 | 10: NRB,c = 52 (FDD) | |
|  | | |  | 2 | 10: NRB,c = 52 (TDD) | |
|  | | |  | 3 | 40: NRB,c = 106 (TDD) | |
| PDSCH reference measurement channel | | |  | 1 | SR.1.1 FDD | |
|  | | |  | 2 | SR.1.1 TDD | |
|  | | |  | 3 | SR.2.1 TDD | |
| CORESET reference channel | | |  | 1 | CR.1.1 FDD | |
|  | 2 | CR.1.1 TDD | |
|  | 3 | CR.2.1 TDD | |
| BWP configurations | Initial DL BWP | |  | 1, 2, 3 | DLBWP.0.1 | |
|  | Dedicated DL BWP | |  | 1, 2, 3 | DLBWP.1.1 | |
|  | Initial UL BWP | |  | 1, 2, 3 | ULBWP.0.1 | |
|  | Dedicated UL BWP | |  | 1, 2, 3 | ULBWP.1.1 | |
| OCNG patternNote1 | | |  | 1, 2, 3 | OP.1 | |
| SMTC configuration | | |  | 1, 2, 3 | SMTC.1 | |
| SSB configuration | | |  | 1, 2 | SSB.1 FR1 | |
|  | | |  | 3 | SSB.2 FR1 | |
| CSI-RS for tracking | | |  | 1 | TRS.1.1 FDD | |
| 2 | TRS.1.1 TDD | |
| 3 | TRS.1.2 TDD | |
| EPRE ratio of PSS to SSS | | | dB | 1, 2, 3 | 0 | |
| EPRE ratio of PBCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PBCH to PBCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDCCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | |  |  |  | |
| EPRE ratio of PDSCH\_DMRS to SSS | | |  |  |  | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | |  |  |  | |
| EPRE ratio of OCNG DMRS to SSS | | |  |  |  | |
| EPRE ratio of OCNG to OCNG DMRS | | |  |  |  | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2, 3 | -106 | |
| *Noc*Note2 | | | dBm/SCS | 1, 2 | -106 | |
|  | | |  | 3 | -103 | |
| Ês/Noc | | | dB | 1, 2, 3 | 18 | -2 |
| Ês/IotNote3 | | | dB | 1, 2, 3 | 18 | -2 |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2 | -88 | -108 |
|  | | |  | 3 | -85 | -105 |
| SSB\_RPNote3 | | | dBm/SCS | 1, 2 | -88 | -108 |
|  | | |  | 3 | -85 | -105 |
| IoNote3 | | | dBm/9.36 MHz | 1, 2 | -59.98 | -75.92 |
|  | | | dBm/38.16 MHz | 3 | -53.88 | -69.82 |
| Propagation condition | | |  | 1, 2, 3 | ETDLA30 | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2, 3 | 1x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

Table A.6.6.5.1.1-4: UTRAN neighbour cell specific test parameters for SA inter-RAT UTRAN FDD event triggered reporting in non-DRX with PCell in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | |
|  |  | T1 | T2 |
| UTRA RF Channel Number |  | 2 | |
| CPICH\_Ec/Ior | dB | -10 | |
| PCCPCH\_Ec/Ior | dB | -12 | |
| SCH\_Ec/Ior | dB | -12 | |
| PICH\_Ec/Ior | dB | -15 | |
| DPCH\_Ec/Ior | dB | N/A | |
| OCNS |  | -0.941 | |
|  | dB | -Infinity | -1.8 |
|  | dBm/3.84 MHz | -70 | |
| CPICH\_Ec/Io | dB | -Infinity | -14 |
| Propagation Condition |  | AWGN | |
| Note 1: The DPCH level is controlled by the power control loop.  Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior. | | | |

##### A.6.6.5.1.2 Test Requirements

The UE shall send one Event B1 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 2.4s from the start of period T2, i.e. when Cell 2 becomes detectable. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

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

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

<End of Change 9>