**3GPP TSG-RAN4 Meeting #100-e *R4-2115470***

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

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **38.133** | **CR** | **2217** | **rev** | **-** | **Current version:** | **16.8.0** |  |
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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 2 (Rel-16)  |
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| ***Source to WG:*** | MCC, CATT |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_UE\_pow\_sav-CoreNR\_CSIRS\_L3meas-CoreNR\_Mob\_enh-CoreNR\_UE\_pow\_sav-PerfTEI16 |  | ***Date:*** | 2021-08-30 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe 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. R4-2111961 Draft CR on UE power saving requirements
	* In 4.2.2.11.3, it should be cellEdgeEvaluation criterion but not lowmobility.
	* In 4.2.2.9~4.2.2.11, IE name "lowMobilityEvaluation" is not the same as definition in 38.331 and 38.304
	* In 4.2.2.10.2 &4.2.2.11.2&4.2.2.10.3&4.2.2.11.3, the conditions are messed up and incorrect.
	* Format of 4.2.2.11 and 4.2.2.11.1 is incorrect
2. R4-2112119 Draft CR on CSSF for CSI-RS L3 RRM R16
	* The current CSSFoutside\_gap,i is not correct in note 3 for EN-DC,SA and NE-DC.
3. R4-2115432 Scheduling restriction applicability for FR1 and FR1+FR2 inter-band CA R16 [Sch\_Restr\_InterBandCA]
	* The scheduling restriction applicability for FR1 and FR1+FR2 inter-band CA case is missing in TS38.133
4. R4-2112515 Draft CR on requirements applicability for CSI-RS based L3 measurement
	* In current spec, there is editor’s note: FFS whether the conditions for two separate 5ms windows apply also to the case when all CSI-RS resources on one intra-frequency layer are configured within one single windows.
	* However, the above issue was resolved in last meeting. According to the agreed WF (R4-2108317), the conditions apply for the case of two separated 5ms windows during one CSI-RS period **only**, which means the conditions does not apply to the case when all CSI-RS resources on one intra-frequency layer are configured within one single windows.
5. R4-2113814 Correction to DAPS handover requirements R16
	* For FR1 DAPS hadover, the synchronous conditions are defined with adding 3 notes. In current specification, Notes 2/3 clairfies to leave enough time for UE performing DL-to-UL and UL-to-DL switching only from single cell perspective. However, the UE shall be allowed to switching time between both source cell and target cell.
6. R4-2113884 [draft CR] maintenance for conditional PSCell change
	* In the main equation in 8.11B.2, the RRC processing delay is represented by TRRC\_processing. However, below in the context, it is expressed as TRRC\_delay.
7. R4-2115322 Draft CR on CSI-RS based measurement requirements
	* The starting point of 5ms window is only for intra-frequency measurement and should not be in the introduction section.
	* Two separate 5ms windows for intra-frequency measurementshould be also supported in FR2.
	* The SFN acquisition time for FR1 in intra-frequency measurement is missing.
	* For SSB index acquisition time in intra-frequency measurement, the intra-frequency measurement with gap and inter-frequency (i.e. TSSB\_time\_index\_intra in clause 9.2.6.2 and TSSB\_time\_index\_inter in clause 9.3.4) should not be considered.
8. R4-2115323 38.133 CR on the CSI-RS resource periodicity
	* In RAN4 96e meeting, the CSI-RS resource periodicity was agreed as in WF R4-2012178. This needs to be added to applicability sections when single 5ms window is configured.
		+ CSI-RS periodicities for L3 measurement: 10, 20, 40 ms
	* The section numbers of Annex B in 9.10.2.2 and 9.10.3.2 are missing.
	* Some editorial corrections.
9. R4-2115324 CR on CSI-RS measurement window
	* Support of 2 measurement window for intra-frequency CSI-RS measurement in FR2 is FFS.
	* The CSI-RS measurement window alignment for FR2 has been missed.
10. R4-2115326 Draft CR on cell reselection test case for UE Power saving
	* In A.7.1.1.3

1a. the cell is already detected but not newly.1b. incorrect table index* + In A.7.1.1.4, the parameter SSearchThresholdP in TS 38.331 is not optional for power saving.
	+ In A.7.1.1.6, same as change 2. the square bracket has been removed in RAN4#199-e meeting, one left in Table A.7.1.1.6.2-2
1. R4-2115419 Correction on measurement requiements in relaxed measurement

Change #1:SMTC-LP2 is added in SIB2/SIB4 in TEI-16 WI (R2-2000302). Then RAN4 had modified the intra-freq/inter-freq measurement delay requirements under idle/inactive state accordingly, e.g.However, relaxed measurements are discussed under a parallel WI so the impact of SMTC-LP2 is missed in 38.133 cl.4.2.2.9. In our opinion it is natrual for relaxed measurement to consider SMTC-LP2 too.Change #2:In the approved WF [R4-2009265], it is indicated that if T331 is running, the carriers which are configured for EMR shall not be performed with relaxed measurement. For these carriers which are configured for mobility (not for EMR), if UE has fulfilled low mobility or not-at-cell edge criteria, UE shall perform relaxed measurement. If a UE is configured with both EMR measurement carriers (T331 is running) and mobility measurement carriers, and the UE fulfills relaxed measurement criterion (either low mobility or not-at-cell edge criteria), when Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, the measurement requirements are not defined.1. R4-2115420 Correction to test cases of inter-RAT cell re-selection with relaxed measurement criterion R16
	* Note 2 in Table A.6.1.2.3.2-3 and A.6.1.2.4.2-3 indicates Threshx,highP is configured in NR system. However according to test purpose, E-UTRA cell is the lower priority, so in the NR system Threshx,low should be configured to ensure UE could re-select to E-UTRA cell.
	* The test requirements are not accurate
	* Configuration for relaxed measurement is missing in A.6.1.2.4
	* SSearchThresholdP should be the same during T1 and T2, otherwise a SI modification would be required.
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| ***Summary of change:*** | The summary of change in each endorsed draft CR is copied below.1. R4-2111961 Draft CR on UE power saving requirements
	* Change it in the table 4.2.2.11.3-1
	* Fix the misalignment IE name with 38.331
	* Fix the condition
	* Change format of 4.2.2.11 and 4.2.2.11.1 to heading for alignment
2. R4-2112119 Draft CR on CSSF for CSI-RS L3 RRM R16
	* If only one FR2 SCell/SCC is configured with MO and no any inter-frequency MO without MG is configured, we still need to consider if CSI-RS L3 MO is configured or only SSB based L3 MO is configured.
3. R4-2115432 Scheduling restriction applicability for FR1 and FR1+FR2 inter-band CA R16 [Sch\_Restr\_InterBandCA]
	* Proposal 1: RAN4 to introduce applicability of scheduling availability requirement for FR1 inter-band CA such that the scheduling availability requirements for FR1 inter-band CA are not applicable if the network configures simultaneous UL/DL between two FR1 bands but the UE does not have the capability of supporting simultaneousRxTxInterBandCA.
	* Proposal 2: RAN4 to introduce applicability of scheduling availability requirement for FR1+FR2 inter-band CA such that the scheduling availability requirements for FR1+FR2 CA are not applicable if the network configures simultaneous UL/DL between FR1 and FR2 bands but the UE does not have the capability of supporting simultaneousRxTxInterBandCA on this band combination.
4. R4-2112515 Draft CR on requirements applicability for CSI-RS based L3 measurement
	* Remove the editor’s note: FFS whether the conditions for two separate 5ms windows apply also to the case when all CSI-RS resources on one intra-frequency layer are configured within one single windows.
5. R4-2113814 Correction to DAPS handover requirements R16
	* To correct Notes 2/3 in Table 6.1.3.2-1.
6. R4-2113884 [draft CR] maintenance for conditional PSCell change
	* Throughout TS 38.133, both expressions are used. To self-align, it is proposed to change TRRC\_processing in the equation to TRRC\_delay.
7. R4-2115322 Draft CR on CSI-RS based measurement requirements
	* Move the starting point definition of 5ms window to intra-frequency measurement section.
	* Remove the editor’s notes on two separated 5ms windows.
	* Add the SFN acquisition time in FR1.
	* For intra-frequency measurement, remove the TSSB\_time\_index\_intra in clause 9.2.6.2 and TSSB\_time\_index\_inter in clause 9.3.4 to align with other CSI-RS requirements.
8. R4-2115323 38.133 CR on the CSI-RS resource periodicity
	* The CSI-RS resource periodicity was added to the applicability sections for intra-frequency and inter-frequency measurements. And the section numbers of Annex B are fixed.
9. R4-2115324 CR on CSI-RS measurement window
	* Remove the editor note in 9.10.2.2 about support of 2 measurement window for FR2, which means 2 measurement window is supported for both FRs.
	* Add the applicability condition regarding CSI-RS measurement window alignment for FR2, by re-using the same condition defined for SSB measurement.
10. R4-2115326 Draft CR on cell reselection test case for UE Power saving
	* In A.7.1.1.3

1a. change text to “an already”1b. fix incorrect table index reference* + Change value of SSearchThresholdP in A.7.1.1.4 & 7.1.1.6
	+ Remove one missing square bracket
1. R4-2115419 Correction on measurement requiements in relaxed measurement
	* Requirements for relaxed intra-freq measurement is updated to consider SMTC-LP2.
	* Specify the requirements when there are both non-relaxed measurement carriers and relaxed measurement carriers.

- Detection requirements: Ncarrier\_Relax \* Tdetect,NR\_Inter\_Relax + Ncarrier\_Non\_relax \* Tdetect,NR\_Inter. - Measurements requirements: Ncarrier\_Relax \* Tmeasure,NR\_Inter\_Relax + Ncarrier\_Non\_relax \* Tmeasure,NR\_Inter. - Evaluation requirements: Ncarrier\_Relax \* Tevaluate,NR\_Inter\_Relax + Ncarrier\_Non\_relax \* Tevaluate,NR\_Inter.- The parameter Ncarrier\_Relax is the total number of configured inter-frequency carriers indicated by the serving cell and the number of NR inter-frequency carriers configured for idle mode CA measurements (while T331 is not running). - The parameter Ncarrier\_Non\_relax is the total number of NR inter-frequency carriers configured for idle mode CA measurements (while T331 is running).1. R4-2115420 Correction to test cases of inter-RAT cell re-selection with relaxed measurement criterion R16
	* Move Note 2 from Threshx,highP to Threshx,low in Table A.6.1.2.3.2-3 and A.6.1.2.4.2-3.
	* The cell reselection delay beginning is changed to T1 for A.6.1.2.3 and A.6.1.2.4
	* UE is expected to perfor TA update procedure in A.6.1.2.3
	* Relaxed measurement configuration is added to A.6.1.2.4
	* SSearchThresholdP is set to the same value for T1 and T2
	* Editorial correction for table reference in test requirements of A.6.1.2.4
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| ***Consequences if not approved:*** | The consequences if not approved for each endorsed draft CR are coppied below.1. R4-2111961 Draft CR on UE power saving requirements
	* The power saving core requirements have incorrect conditions.
2. R4-2112119 Draft CR on CSSF for CSI-RS L3 RRM R16
	* The current CSSFoutside\_gap,i is not correct in note 3 for EN-DC,SA and NE-DC.
3. R4-2115432 Scheduling restriction applicability for FR1 and FR1+FR2 inter-band CA R16 [Sch\_Restr\_InterBandCA]
	* The scheduling restriction applicability for FR1 and FR1+FR2 inter-band CA case is missing in TS38.133
4. R4-2112515 Draft CR on requirements applicability for CSI-RS based L3 measurement
	* The requirements are not complete
5. R4-2113814 Correction to DAPS handover requirements R16
	* The DAPS handover requirements are not properly defined
6. R4-2113884 [draft CR] maintenance for conditional PSCell change
	* The expression in the equation and the context are not aligned and might cause confusion.
7. R4-2115322 Draft CR on CSI-RS based measurement requirements
	* The CSI-RS based measurement requirements are incomplete.
8. R4-2115323 38.133 CR on the CSI-RS resource periodicity
	* The UE CSI-RS based measurement requirements are not clear enough.
9. R4-2115324 CR on CSI-RS measurement window
	* Support of 2 measurement window for FR2 is unclear. UE complexity for CSI-RS measurement is quite high without applicability condition regarding CSI-RS measurement window alignment.
10. R4-2115326 Draft CR on cell reselection test case for UE Power saving
	* The Test Requirements is incorrect.
11. R4-2115419 Correction on measurement requiements in relaxed measurement
	* The specification is not correct.
12. R4-2115420 Correction to test cases of inter-RAT cell re-selection with relaxed measurement criterion R16
	* The test cases can’t be performed correctly
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| ***Clauses affected:*** | 1. R4-2111961 Draft CR on UE power saving requirements
	* 4.2.2.9, 4.2.2.10, 4.2.2.11;
2. R4-2112119 Draft CR on CSSF for CSI-RS L3 RRM R16
	* 9.1.5.1.1, 9.1.5.1.2, 9.1.5.1.4;
3. R4-2115432 Scheduling restriction applicability for FR1 and FR1+FR2 inter-band CA R16 [Sch\_Restr\_InterBandCA]
	* 3.6.9;
4. R4-2112515 Draft CR on requirements applicability for CSI-RS based L3 measurement
	* 9.10.2.2;
5. R4-2113814 Correction to DAPS handover requirements R16
	* 6.1.3.2
6. R4-2113884 [draft CR] maintenance for conditional PSCell change
	* 8.11B.2
7. R4-2115322 Draft CR on CSI-RS based measurement requirements
	* 9.10.1, 9.10.2.2, 9.10.2.5, 9.10.3.2, 9.10.3.5
8. R4-2115323 38.133 CR on the CSI-RS resource periodicity
	* 9.10.1, 9.10.2.2 and 9.10.3.2
9. R4-2115324 CR on CSI-RS measurement window
	* 9.1.5.1
10. R4-2115326 Draft CR on cell reselection test case for UE Power saving
	* A.7.1.1.3 A.7.1.1.4 A.7.1.1.6
11. R4-2115419 Correction on measurement requiements in relaxed measurement
	* 4.2.2.9, 4.2.2.10; 4.2.2.11
12. R4-2115420 Correction to test cases of inter-RAT cell re-selection with relaxed measurement criterion R16
	* A.6.1.2.3, A.6.1.2.4
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|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |   |

<Start of Change 1-CR R4-2115432>

### 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, 9.2.5.3.3, 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 R4-2111961 and R4-2115419>

----------------------------------------------------- Beginning of Change 1 ------------------------------------------------------------

#### 4.2.2.9 Measurements of intra-frequency NR cells for UE configured with relaxed measurement criterion

##### 4.2.2.9.1 Introduction

This clause contains the requirements for measurements on intra-frequency NR cells when Srxlev ≤ SIntraSearchP or Squal ≤ SIntraSearchQ and when the UE is configured any of the following relaxed measurement critera:

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

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

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

##### 4.2.2.9.2 Measurements for UE fulfilling low mobility criterion

This clause contains requirements for measurements on intra-frequency NR cells provided that:

- UE is configured with *lowMobilityEvaluation* [2] criterion and UE has fulfilled, or

- UE is configured with both *lowMobilityEvaluation* [2] criterion and *cellEdgeEvaluation* [2] criterion and *combineRelaxedMeasCondition* [2] not configured, and UE has fulfilled only the *lowMobilityEvaluation* [2] criterion.

The requirements defined in clause 4.2.2.3 apply for this clause except that:

- Tdetect,NR\_Intraas specified in Table 4.2.2.9.2-1.

- Tmeasure,NR\_Intra as specified in Table 4.2.2.9.2-1.

- Tevaluate,NR\_Intra as specified in Table 4.2.2.9.2-1.

Table 4.2.2.9.2-1: Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra[s] (number of DRX cycles) |
|  | FR1 | FR2Note1 |
| 0.32 | 1 | 8 | 11.52 x N1 x M2 x K1 (36 x N1 x M2 x K1) | 1.28 x N1 x M2 x K1 (4 x N1 x M2 x K1) | 5.12 x N1 x M2 x K1 (16 x N1 x M2 x K1) |
| 0.64 |  | 5 | 17.92 x N1 x K1 (28 x N1 x K1) | 1.28 x N1 x K1 (2 x N1 x K1) | 5.12 x N1 x K1 (8 x N1 x K1) |
| 1.28 |  | 4 | 32 x N1 x K1 (25 x N1 x K1) | 1.28 x N1 x K1 (1 x N1 x K1) | 6.4 x N1 x K1 (5 x N1 x K1) |
| 2.56 |  | 3 | 58.88 x N1 x K1 (23 x N1 x K1) | 2.56 x N1 x K1 (1 x N1 x K1) | 7.68 x N1 x K1 (3 x N1 x K1) |
| 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: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1. If high layer signalling *smtc2-LP-r16* is configured, for cells indicated in the *pci-List* parameter in *smtc2-LP-r16*, the SMTC periodicity corresponds to the value of higher layer parameter *smtc2-LP-r16*; for the other cells, the SMTC periodicity corresponds to the value of higher layer parameter *smtc*.Note 3: K1 = 3 is the measurement relaxation factor applicable for UE fulfilling the *lowMobilityEvaluation* [2] criterion. |

##### 4.2.2.9.3 Measurements for UE fulfilling not-at-cell edge criterion

This clause contains requirements for measurements on intra-frequency NR cells provided that:

- UE is configured with *cellEdgeEvaluation* [2] criterion and UE has fulfilled, or

- UE is configured with both *lowMobilityEvaluation* [2] criterion and *cellEdgeEvaluation* [2] criteria and *combineRelaxedMeasCondition* [2] not configured, and UE has fulfilled only the *cellEdgeEvaluation* [2] criterion.

The requirements defined in clause 4.2.2.3 apply for this clause except that:

- Tdetect,NR\_Intraas specified in Table 4.2.2.9.3-1.

- Tmeasure,NR\_Intra as specified in Table 4.2.2.9.3-1.

- Tevaluate,NR\_Intra as specified in Table 4.2.2.9.3-1.

Table 4.2.2.9.3-1: Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra[s] (number of DRX cycles) |
|  | FR1 | FR2Note1 |
| 0.32 | 1 | 8 | 11.52 x N1 x M2 x K1 (36 x N1 x M2 x K1) | 1.28 x N1 x M2 x K1 (4 x N1 x M2 x K1) | 5.12 x N1 x M2 x K1 (16 x N1 x M2 x K1) |
| 0.64 |  | 5 | 17.92 x N1 x K1 (28 x N1 x K1) | 1.28 x N1 x K1 (2 x N1 x K1) | 5.12 x N1 x K1 (8 x N1 x K1) |
| 1.28 |  | 4 | 32 x N1 x K1 (25 x N1 x K1) | 1.28 x N1 x K1 (1 x N1 x K1) | 6.4 x N1 x K1 (5 x N1 x K1) |
| 2.56 |  | 3 | 58.88 x N1 x K1 (23 x N1 x K1) | 2.56 x N1 x K1 (1 x N1 x K1) | 7.68 x N1 x K1 (3 x N1 x K1) |
| 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: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1. If high layer signalling *smtc2-LP-r16* is configured, for cells indicated in the *pci-List* parameter in *smtc2-LP-r16*, the SMTC periodicity corresponds to the value of higher layer parameter *smtc2-LP-r16*; for the other cells, the SMTC periodicity corresponds to the value of higher layer parameter *smtc*.Note 3: K1 = 3 is the measurement relaxation factor applicable for UE fulfilling the *cellEdgeEvaluation* [2] criterion. |

##### 4.2.2.9.4 Measurements for UE fulfilling low mobility and not-at-cell edge criteria

This clause contains requirements for measurements on intra-frequency NR cells provided that:

- UE is configured with both *lowMobilityEvaluation* [2] criterion and *cellEdgeEvaluation* [2] criterion, and

- has also fulfilled both criteria, and

- less than 1 hour have passed since measurements for cell reselection were last performed

In this case the UE is not required to meet Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra as defined in Table 4.2.2.3-1.

------------------------------------------------------------- End of change 1 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 2 ------------------------------------------------------------

#### 4.2.2.10 Measurements of inter-frequency NR cells for UE configured with relaxed measurement criterion

##### 4.2.2.10.1 Introduction

This clause contains the requirements for measurements on inter-frequency NR cells when the UE is configured with any of following relaxed measurement criteria:

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

- Relaxed measurement criterion for UE not-at-cell edge defined in clause 5.2.4. 9.2 in [1],

- Both low mobility criterion and not-at-cell edge criterion as defined in clauses 5.2.4. 9.1 and 5.2.4.9.2 in [1] respectively.

##### 4.2.2.10.2 Measurements for UE fulfilling low mobility criterion

This clause contains requirements for measurements on inter-frequency NR cells provided that:

- UE is configured with *lowMobilityEvaluation* [2] criterion and UE has fulfilled, or

- UE is configured with both *lowMobilityEvaluation* [2] and *cellEdgeEvaluation* [2] criterion and *combineRelaxedMeasCondition* [2] not configured, and

- UE has fulfilled only the *lowMobilityEvaluation* [2] criterion.

The UE shall not relax measurements on NR inter-frequency carriers configured for idle mode CA/DC measurements (defined in clause 4.4) while T331 is running.

When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ then the requirements are defined as follows: :

- Tdetect,NR\_Inter\_Relaxas specified in Table 4.2.2.10.2-1.

- Tmeasure,NR\_Inter\_Relax as specified in Table 4.2.2.10.2-1.

- Tevaluate,NR\_Inter\_Relax as specified in Table 4.2.2.10.2-1.

- The UE shall be able to evaluate whether a newly detectable inter-frequency NR cell meets the reselection criteria defined in TS38.304 [1] within Ncarrier\_Relax \* Tdetect,NR\_Inter\_Relax + Ncarrier\_Non\_relax \* Tdetect,NR\_Inter. Cells which have been detected shall be measured at least every Ncarrier\_Relax \* Tmeasure,NR\_Inter\_Relax + Ncarrier\_Non\_relax \* Tmeasure,NR\_Inter. The UE shall be able to evaluate that an already identified inter-frequency NR cell has met reselection criterion defined in TS 38.304 [1] within Ncarrier\_Relax \*Tevaluate,NR\_Inter\_Relax + Ncarrier\_Non\_relax \* Tevaluate,NR\_Inter.

-    When T331 is running,

-     The parameter Ncarrier\_Relax is the total number of NR inter-frequency carriers not configured for idle mode CA/DC measurements.

-    The parameter Ncarrier\_Non\_relax is the total number of NR inter-frequency carriers configured for idle mode CA/DC measurements.

-    When T331 is not running,

- The parameter Ncarrier\_Relax is the total number of inter-frequency carriers configured for mobility measurements only and the number of inter-frequency carriers configured for both mobility measurement and idle mode CA/DC measurements.

-    The parameter Ncarrier\_Non\_relax =0.

When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ and the UE is configured with *highPriorityMeasRelax* [2] then the UE shall search for inter-frequency layers of higher priority at least every K2\*Thigher\_priority\_search seconds where Thigher\_priority\_search is described in clause 4.2.2.7 and, K2 = 60. Otherwise if the UE is not configured with *highPriorityMeasRelax* [2] then the UE shall search for inter-frequency layers of higher priority at least every Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7.

Table 4.2.2.10.2-1: Tdetect,NR\_Inter\_Relax, Tmeasure,NR\_Inter\_Relax and Tevaluate,NR\_Inter\_Relax

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | Tdetect,NR\_Inter\_Relax [s] (number of DRX  | Tmeasure,NR\_Inter\_Relax [s] (number of DRX cycles) | Tevaluate,NR\_Inter\_Relax [s] (number of DRX cycles) |
|  | FR1 | FR2Note1 | cycles) |  |  |
| 0.32 | 1 | 8 | 11.52 x N1 x 1.5 x K1 (36 x N1 x 1.5 x K1) | 1.28 x N1 x 1.5 x K1 (4 x N1 x 1.5 x K1) | 5.12 x N1 x 1.5 x K1 (16 x N1 x 1.5 x K1) |
| 0.64 |  | 5 | 17.92x N1 x K1 (28 x N1 x K1) | 1.28 x N1 x K1 (2 x N1 x K1) | 5.12 x N1 x K1 (8 x N1 x K1) |
| 1.28 |  | 4 | 32 x N1 x K1 (25 x N1 x K1) | 1.28 x N1 x K1 (1 x N1 x K1) | 6.4 x N1 x K1 (5 x N1 x K1) |
| 2.56 |  | 3 | 58.88 x N1 x K1 (23 x N1 x K1) | 2.56 x N1 x K1 (1 x N1 x K1) | 7.68 x N1 x K1 (3 x N1 x K1) |
| 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: K1 = 3 is the measurement relaxation factor applicable for UE fulfilling the low mobility. |

##### 4.2.2.10.3 Measurements for UE fulfilling not-at-cell edge criterion

This clause contains requirements for measurements on inter-frequency NR cells provided that:

- UE is configured with *cellEdgeEvaluation* [2] criterion, and UE has fulfilled or

- UE is configured with both *lowMobilityEvaluation* [2] criterion and *cellEdgeEvaluation* [2] criterion and *combineRelaxedMeasCondition* [2] not configured, and

- UE has fulfilled only the *cellEdgeEvaluation* [2] criterion.

The UE shall not relax measurements on NR inter-frequency carriers configured for idle mode CA/DC measurements (defined in clause 4.4) while T331 is running.

When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ then the requirements defined in clause 4.2.2.4 apply for this clause except that:

- Tdetect,NR\_Inter\_Relaxas specified in Table 4.2.2.10.3-1.

- Tmeasure,NR\_Inter\_Relax as specified in Table 4.2.2.10.3-1.

- Tevaluate,NR\_Inter\_Relax as specified in Table 4.2.2.10.3-1.- The UE shall be able to evaluate whether a newly detectable inter-frequency NR cell meets the reselection criteria defined in TS38.304 [1] within Ncarrier\_Relax \* Tdetect,NR\_Inter\_Relax + Ncarrier\_Non\_relax \* Tdetect,NR\_Inter. Cells which have been detected shall be measured at least every Ncarrier\_Relax \* Tmeasure,NR\_Inter\_Relax + Ncarrier\_Non\_relax \* Tmeasure,NR\_Inter. The UE shall be able to evaluate that an already identified inter-frequency NR cell has met reselection criterion defined in TS 38.304 [1] within Ncarrier\_Relax \* Tevaluate,NR\_Inter\_Relax + Ncarrier\_Non\_relax \* Tevaluate,NR\_Inter.

-    When T331 is running,

-     The parameter Ncarrier\_Relax is the total number of NR inter-frequency carriers not configured for idle mode CA/DC measurements.

-    The parameter Ncarrier\_Non\_relax is the total number of NR inter-frequency carriers configured for idle mode CA/DC measurements.

-    When T331 is not running,

- The parameter Ncarrier\_Relax is the total number of inter-frequency carriers configured for mobility measurements only and the number of inter-frequency carriers configured for both mobility measurement and idle mode CA/DC measurements.

-    The parameter Ncarrier\_Non\_relax =0.

When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ and regardless of whether the UE is configured with *highPriorityMeasRelax* [2] or not, the UE shall search for inter-frequency layers of higher priority at least every Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7

Table 4.2.2.10.3-1: Tdetect,NR\_Inter\_Relax, Tmeasure,NR\_Inter\_Relax and Tevaluate,NR\_Inter\_Relax

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | Tdetect,NR\_Inter\_Relax [s] (number of DRX  | Tmeasure,NR\_Inter\_Relax [s] (number of DRX cycles) | Tevaluate,NR\_Inter\_Relax [s] (number of DRX cycles) |
|  | FR1 | FR2Note1 | cycles) |  |  |
| 0.32 | 1 | 8 | 11.52 x N1 x 1.5 x K1 (36 x N1 x 1.5 x K1) | 1.28 x N1 x 1.5 x K1 (4 x N1 x 1.5 x K1) | 5.12 x N1 x 1.5 x K1 (16 x N1 x 1.5 x K1) |
| 0.64 |  | 5 | 17.92x N1 x K1 (28 x N1 x K1) | 1.28 x N1 x K1 (2 x N1 x K1) | 5.12 x N1 x K1 (8 x N1 x K1) |
| 1.28 |  | 4 | 32 x N1 x K1 (25 x N1 x K1) | 1.28 x N1 x K1 (1 x N1 x K1) | 6.4 x N1 x K1 (5 x N1 x K1) |
| 2.56 |  | 3 | 58.88 x N1 x K1 (23 x N1 x K1) | 2.56 x N1 x K1 (1 x N1 x K1) | 7.68 x N1 x K1 (3 x N1 x K1) |
| 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: K1 = 3 is the measurement relaxation factor applicable for UE fulfilling the *cellEdgeEvaluation* [2] criterion. |

##### 4.2.2.10.4 Measurements for UE fulfilling low mobility and not-at-cell edge criterion

This clause contains requirements for measurements on inter-frequency NR cells provided that:

- T331 timer is not running for EMR measurements on inter-frequency NR carrier, and

- UE is configured with both *lowMobilityEvaluation* [2] criterion and *cellEdgeEvaluation* [2] criterion, and

- Has also fulfilled both criteria, and

- less than 1 hour have passed since measurements for cell reselection were last performed

In this case the UE is not required to meet Tdetect,NR\_Inter, Tmeasure,NR\_Inter and Tevaluate,NR\_Inter as defined in Table 4.2.2.4-1.

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

##### 4.2.2.11.1 Introduction

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

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

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

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

##### 4.2.2.11.2 Measurements for UE fulfilling low mobility criterion

This clause contains requirements for measurements on inter-RAT E-UTRAN cells provided that:

- T331 timer is not running for EMR measurements on inter-RAT E-UTRAN, and

- UE is configured with *lowMobilityEvaluation* [2] criterion and UE has fulfilled, or

- UE is configured with both *lowMobilityEvaluation* [2] criterion and *cellEdgeEvaluation* [2] criterion and *combineRelaxedMeasCondition* [2] not configured, and

- UE has fulfilled only the *lowMobilityEvaluation* [2] criterion.

The UE shall not relax measurements on inter-RAT E-UTRAN carriers configured for idle mode CA/DC measurements (defined in clause 4.4) while T331 is running.

When Srxlev ≤ SnonIntraSearchP and Squal ≤ SnonIntraSearchQ then the requirements defined in clause 4.2.2.5 apply for this clause except that:

- Tdetect,EUTRAN\_Relaxas specified in Table 4.2.2.11.2-1.

- Tmeasure,EUTRAN\_Relax as specified in Table 4.2.2.11.2-1.

- Tevaluate,EUTRAN\_Relax as specified in Table 4.2.2.11.2-1.

- The UE shall be able to evaluate whether a newly detectable inter-RAT E-UTRAN cell meets the reselection criteria defined in TS38.304 [1] within Ncarrier\_Relax \* Tdetect,EUTRAN\_Relax + Ncarrier\_Non\_relax \* Tdetect,EUTRAN. Cells which have been detected shall be measured at least every Ncarrier\_Relax \* Tmeasure,EUTRAN\_Relax + Ncarrier\_Non\_relax \* Tmeasure,EUTRAN. The UE shall be able to evaluate that an already identified inter-RAT E-UTRAN cell has met reselection criterion defined in TS 38.304 [1] within NEUTRAN carrier\_Relax \* Tevaluate,EUTRAN\_Relax + NEUTRAN carrier\_Non\_relax \* Tevaluate,EUTRAN.

-    When T331 is running,

-     The parameter Ncarrier\_Relax is the total number of inter-RAT E-UTRAN carriers not configured for idle mode CA/DC measurements.

-    The parameter Ncarrier\_Non\_relax is the total number of inter-RAT E-UTRAN carriers configured for idle mode CA/DC measurements.

-    When T331 is not running,

- The parameter Ncarrier\_Relax is the total number of inter-RAT E-UTRAN carriers configured for mobility measurements only and the number of inter-RAT E-UTRAN carriers configured for both mobility measurement and idle mode CA/DC measurements.

-    The parameter Ncarrier\_Non\_relax =0.

When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ and the UE is configured with *highPriorityMeasRelax* [2] then the UE shall search for E-UTRA inter-RAT frequency layers of higher priority at least every K2\*Thigher\_priority\_search seconds where Thigher\_priority\_search is described in clause 4.2.2.7 and, K2 = 60. Otherwise if the UE is not configured with *highPriorityMeasRelax* [2] then the UE shall search for E-UTRA inter-RAT frequency layers of higher priority at least every Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7.

Table 4.2.2.11.2-1: Tdetect,EUTRAN\_Relax, Tmeasure,EUTRAN\_Relax, and Tevaluate,EUTRAN\_Relax

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Tdetect,EUTRAN\_Relax [s] (number of DRX cycles) | Tmeasure,EUTRAN\_Relax [s] (number of DRX cycles) | Tevaluate,EUTRAN\_Relax[s] (number of DRX cycles) |
| 0.32 | 11.52 x K1 (36 x K1) | 1.28 x K1 (4 x K1) | 5.12 x K1 (16 x K1) |
| 0.64 | 17.92 x K1 (28 x K1) | 1.28 x K1 (2 x K1) | 5.12 x K1 (8 x K1) |
| 1.28 | 32 x K1 (25 x K1) | 1.28 x K1 (1 x K1) | 6.4 x K1 (5 x K1) |
| 2.56 | 58.88 x K1 (23 x K1) | 2.56 (1 x K1) | 7.68 x K1 (3 x K1) |
| Note 1: K1 = 3 is the measurement relaxation factor applicable for UE fulfilling the *lowMobilityEvaluation* [2] criterion. |

##### 4.2.2.11.3 Measurements for UE fulfilling with not-at-cell edge criterion

This clause contains requirements for measurements on inter-RAT E-UTRAN cells provided that:

- T331 timer is not running for EMR measurements on inter-RAT E-UTRAN, and

- UE is configured with *cellEdgeEvaluation* [2] criterion and UE has fulfilled, or

- UE is configured with both *lowMobilityEvaluation* [2] criterion and *cellEdgeEvaluation* [2] criterion and *combineRelaxedMeasCondition* [2] not configured, and

- UE has fulfilled only the *cellEdgeEvaluation* [2] criterion.

The UE shall not relax measurements on inter-RAT E-UTRAN carriers configured for idle mode CA/DC measurements (defined in clause 4.4) while T331 is running.

When Srxlev ≤ SnonIntraSearchP and Squal ≤ SnonIntraSearchQ then the requirements defined in clause 4.2.2.5 apply for this clause except that:

- Tdetect,EUTRAN\_Relaxas specified in Table 4.2.2.11.3-1.

- Tmeasure,EUTRAN\_Relax as specified in Table 4.2.2.11.3-1.

- Tevaluate,EUTRAN\_Relax as specified in Table 4.2.2.11.3-1.

- The UE shall be able to evaluate whether a newly detectable inter-RAT E-UTRAN cell meets the reselection criteria defined in TS38.304 [1] within Ncarrier\_Relax \* Tdetect,EUTRAN\_Relax + Ncarrier\_Non\_relax \* Tdetect,EUTRAN. Cells which have been detected shall be measured at least every Ncarrier\_Relax \* Tmeasure,EUTRAN\_Relax + Ncarrier\_Non\_relax \* Tmeasure,EUTRAN. The UE shall be able to evaluate that an already identified inter-RAT E-UTRAN cell has met reselection criterion defined in TS 38.304 [1] within NEUTRAN carrier\_Relax \* Tevaluate,EUTRAN\_Relax + NEUTRAN carrier\_Non\_relax \* Tevaluate,EUTRAN.

-    When T331 is running,

-     The parameter Ncarrier\_Relax is the total number of inter-RAT E-UTRAN carriers not configured for idle mode CA/DC measurements.

-    The parameter Ncarrier\_Non\_relax is the total number of inter-RAT E-UTRAN carriers configured for idle mode CA/DC measurements.

-    When T331 is not running,

- The parameter Ncarrier\_Relax is the total number of inter-RAT E-UTRAN carriers configured for mobility measurements only and the number of inter-RAT E-UTRAN carriers configured for both mobility measurement and idle mode CA/DC measurements.

-    The parameter Ncarrier\_Non\_relax =0.

When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ and regardless of whether the UE is configured with *highPriorityMeasRelax* [2] or not, the UE shall search for inter-RAT E-UTRAN frequency layers of higher priority at least every Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7.

Table 4.2.2.11.3-1: Tdetect,EUTRAN\_Relax, Tmeasure,EUTRAN\_Relax, and Tevaluate,EUTRAN\_Relax

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Tdetect,EUTRAN [s] (number of DRX cycles) | Tmeasure,EUTRAN [s] (number of DRX cycles) | Tevaluate,EUTRAN[s] (number of DRX cycles) |
| 0.32 | 11.52 x K1 (36 x K1) | 1.28 x K1 (4 x K1) | 5.12 x K1 (16 x K1) |
| 0.64 | 17.92 x K1 (28 x K1) | 1.28 x K1 (2 x K1) | 5.12 x K1 (8 x K1) |
| 1.28 | 32 x K1 (25 x K1) | 1.28 x K1 (1 x K1) | 6.4 x K1 (5 x K1) |
| 2.56 | 58.88 x K1 (23 x K1) | 2.56 x K1 (1 x K1) | 7.68 x K1 (3 x K1) |
| Note 1: K1 = 3 is the measurement relaxation factor applicable for UE fulfilling the *cellEdgeEvaluation* [2] criterion. |

##### 4.2.2.11.4 Measurements for UE fulfilling low mobility and not-at-cell edge criterion

This clause contains requirements for measurements on inter-RAT E-UTRAN cells provided that:

- T331 timer is not running for EMR measurements on inter-RAT E-UTRAN, and

- UE is configured with both *lowMobilityEvaluation* [2] criterion and *cellEdgeEvaluation* [2] criterion, and

- has also fulfilled both criteria, and

- less than 1 hour have passed since measurements for cell reselection were last performed,

In this case the UE is not required to meet Tdetect,EUTRAN , Tmeasure,EUTRAN and Tevaluate,EUTRAN as defined in Table 4.2.2.5-1.

------------------------------------------------------------- End of change 2 ------------------------------------------------------------

<End of Change 2>

<Start of Change 3-CR R4-2113814>

#### 6.1.3.2 NR FR1 - NR FR1 DAPS Handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR FR1 cell to NR FR1 cell. A DAPS handover is intra-frequency if the centre frequency of the SSB of the source cell and the centre frequency of the SSB of the target cell are the same, and the subcarrier spacing of the two SSBs are also the same.

Note: For intra-frequency DAPS handover, no requirement applies if active DL and UL BWP of target cell is not confined within the active DL and UL BWP of the source cell respectively.

Note: For inter-frequency DAPS handover, no requirement applies if the BWP of target cell is overlaped with the BWP of source cell in frequency domain.

An FR1 DAPS handover is synchronous if it meets the conditions in table 6.1.3.2-1, otherwise it is asynchronous

Table 6.1.3.2-1: Sync conditions for FR1 DAPS handover

|  |  |  |
| --- | --- | --- |
| Type of handover | Maximum receive timing difference between source and target cell (µs) for sync DAPS handover | Maximum transmit timing difference between source and target cell (µs) for sync DAPS handover |
| Intra-frequencyNote 1,2,3 | 6µs | 7.6 µs  |
| Intra-band inter-frequency Note 1,2,3 | 6µs | 7.6 µs |
| Inter-band inter-frequency | 33 µs | 34.6 µs |
| Note 1: For synchonous DAPS handover, if the receive time difference exceeds the cyclic prefix length of that SCS, demodulation performance degradation is expected for the first symbol of the slot. For asynchronous DAPS handover, if the receive time difference exceeds the cyclic prefix length of that SCS, interruptions may occur depending on UE implementation. The duration and frequency of occurrence of such interruptions is not specified. Note 2: For DAPS handover on a TDD band, after starting RACH procedure, a UE is not required to transmit in the uplink to any of source and target cells earlier than NRX-TX after the end of the last received downlink symbol from any of source and target cells in the same TDD band where NRX-TX=25600Tc. Note 3: For DAPS handover on a TDD band, after starting RACH procedure, a UE is not required to receive in the downlink from any of source and target cells earlier than NTX-RX after the end of the last transmitted uplink symbol to any of source and target cells in the same TDD band where NTX-RX=25600Tc. |

<End of Change 3>

<Start of Change 4-CR R4-2113884>

### 8.11B.2 Conditoinal PSCell Change delay

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

Upon receiving conditional PSCell change in subframe *n*, the UE shall be capable to transmit PRACH preamble towards the new target PSCell no later than in subframe *n* + Tconfig\_PSCell\_Conditional:

Where:

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

 TRRC\_delay 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].

 Trs is the SMTC periodicity of the target cell if the UE has been provided with an SMTC configuration for the target cell in PSCell addition message, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5 ms. There is no requirement if the SSB transmission periodicity is not 5 ms.

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

<End of Change 4>

<Start of Change 5-CR R4-2115324>

#### 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 xxx, 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 xxx, 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.

<End of Change 5>

<Start of Change 6-CR R4-2112119>

##### 9.1.5.1.1 EN-DC mode: carrier-specific scaling factor for SSB-based, CSI-RS based L3 measurements and RSSI and channel occupancy measurements performed outside gaps

For UE configured with the E-UTRA-NR dual connectivity operation, the carrier-specific scaling factor CSSFoutside\_gap,i for intra-frequency SSB-based measurements, inter-frequency SSB-based measurements performed outside measurements gaps, intra-frequency CSI-RS L3 measurement and RSSI/channel occupancy measurement with no measurement gap on a carrier subject to CCA when SMTC and RMTC are overlapping will be as specified in Table 9.1.5.1.1-1.

Table 9.1.5.1.1-1: CSSFoutside\_gap,i scaling factor for EN-DC mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Scenario | *CSSF*outside\_gap,i for FR1 PSCC | *CSSF*outside\_gap,i for FR1 SCC | *CSSF*outside\_gap,i for FR2 PSCC | *CSSF*outside\_gap,i for FR2 SCC where neighbour cell measurement is required Note 2 | *CSSF*outside\_gap,i for FR2 SCC where neighbour cell measurement is not required | *CSSF*outside\_gap,i for inter-frequency MO with no measurement gp |
| **EN-DC with FR1 only CA**  | 1+NPSCC\_CSIRS+NPSCC\_CCA\_RSSI/CO  | NSCC\_SSB +Y+2x NSCC\_CSIRS+ NSCC\_CCA\_RSSI/CO | N/A | N/A | N/A | NSCC\_SSB +Y+2x NSCC\_CSIRS  |
| **EN-DC with****FR2 only intra band CA**  | N/A | N/A | 1+NPSCC\_CSIRS  | N/A | NSCC\_SSB +Y+2x NSCC\_CSIRS  | NSCC\_SSB +Y+2x NSCC\_CSIRS  |
| **EN-DC with****FR2 only inter band CA** | N/A | N/A | 1+NPSCC\_CSIRS | 2x(1+ NSCC\_CSIRS\_FR2\_NCM) Note 3,5 | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) |
| **EN-DC with****FR1 +FR2 CA (FR1 PSCell) Note 1** | 1+NPSCC\_CSIRS  | 2×( NSCC\_SSB +Y+2xNSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) | N/A | 2x(1+NSCC\_CSIRS\_FR2\_NCM) Note 3  | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) |
| **EN-DC with****FR1 +FR2 CA (FR2 PSCell) Note 1** | N/A | NSCC\_SSB +Y+2x NSCC\_CSIRS | 1+NPSCC\_CSIRS  | N/A | NSCC\_SSB+Y+2x NSCC\_CSIRS  | NSCC\_SSB+Y+2x NSCC\_CSIRS |
| Note 1: Only one NR FR1 operating band and one NR FR2 operating band are included for FR1+FR2 inter-band EN-DC.Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2. Note 3: CSSFoutside\_gap,i =1 if only one SCell is configured and no inter-frequency MO without gap and only SSB based L3 measurement is configured on SCC; CSSFoutside\_gap,i =2 if only one SCell is configured and no inter-frequency MO without gap and either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement is configured on SCC.Note 4: Y is the number of configured inter-frequency MOs without MG that are being measured outside of MG for CA capable UE; otherwise, it is 0.Note 5: Only two NR FR2 operating band are included for EN-DC with FR2 only inter-band CA Note 6: NPSCC\_CSIRS=1 if PSCC is with either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement configured; otherwise, NPSCC\_CSIRS =0.Note 7: NSCC\_CSIRS=Number of configured SCell(s) with either both SSB and CSI-RS based L3 measurement configured or only CSI-RS based L3 measurement configuredNote 8: NSCC\_CSIRS\_FR2\_NCM=1 if FR2 SCC, where neighbour cell measurement is required, is with either both SSB and CSI-RS configured or only CSI-RS measurement configured; otherwise, NSCC\_CSIRS\_FR2\_NCM=0.Note 9: NSCC\_SSB=Number of configured SCell(s) with only SSB based L3 measurement configuredNote 10: NPSCC\_CCA\_RSSI/CO= 1 if PSCC is configured with RSSI/CO measurements without MG when RMTC and SMTC are overlapping; NSCC\_CCA\_RSSI/CO = Number of MOs for SCell(s) configured with RSSI/CO measurements without MG when RMTC and SMTC are overlapping.Note 11 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], otherwise they are counted separately as two measurement objects. |

##### 9.1.5.1.2 SA mode: carrier-specific scaling factor for SSB-based, CSI-RS based L3 measurements and RSSI and channel occupancy measurements performed outside gaps

For UE in SA operation mode, the carrier-specific scaling factor CSSFoutside\_gap,i for intra-frequency SSB-based measurements, inter-frequency SSB-based measurements performed outside measurements gaps, intra-frequency CSI-RS L3 measurement and RSSI/channel occupancy measurement with no measurement gap on a carrier subject to CCA when SMTC and RMTC are overlapping will be as specified in Table 9.1.5.1.2-1, which shall also be applied for a UE configured with NE-DC operation.

Table 9.1.5.1.2-1: CSSFoutside\_gap,i scaling factor for SA mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Scenario | *CSSF*outside\_gap,i for FR1 PCC | *CSSF*outside\_gap,i for FR1 SCC | *CSSF*outside\_gap,i for FR2 PCC | *CSSF*outside\_gap,i for FR2 SCC where neighbour cell measurement is required | *CSSF* outside\_gap,i for FR2 SCC where neighbour cell measurement is not required | *CSSF*outside\_gap,i for inter-frequency MO with no measurement gap |
| **FR1 only CA**  | 1+NPCC\_CSIRS + NPCC\_CCA\_RSSI/CO | NSCC\_SSB +Y+2x NSCC\_CSIRS+ NSCC\_CCA\_RSSI/CO | N/A | N/A | N/A | NSCC\_SSB +Y+2x NSCC\_CSIRS |
| **FR2 only intra band CA**  | N/A | N/A | 1+NPCC\_CSIRS  | N/A | NSCC\_SSB +Y+2x NSCC\_CSIRS | NSCC\_SSB +Y+2x NSCC\_CSIRS |
| **FR2 only inter band CA** | N/A | N/A | 1 | 2\*(1+ NSCC\_CSIRS\_FR2\_NCM) Note 3,5 | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) |
| **FR1 +FR2 CA (FR1 PCell) Note 1** | 1+NPCC\_CSIRS  | 2×( NSCC\_SSB +Y+2\* NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) | N/A | 2x(1+ NSCC\_CSIRS\_FR2\_NCM) Note 3,5 | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) |
| Note 1: Only one FR1 operating band and one FR2 operating band are included for FR1+FR2 inter-band CA.Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.Note 3: CSSFoutside\_gap,i =1 if only one SCell is configured and no inter-frequency MO without gap and only SSB based L3 measurement is configured on SCC; CSSFoutside\_gap,i =2 if only one SCell is configured and no inter-frequency MO without gap and either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement is configured on SCC.Note 4: Y is the number of configured inter-frequency MOs without MG that are being measured outside of MG for CA capable UE; otherwise, it is 0.Note 5: Only two NR FR2 operating bands are included for FR2 inter-band CA.Note 6: NPCC\_CSIRS=1 if PCC is with either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement configured; otherwise, NPCC\_CSIRS =0.Note 7: NSCC\_CSIRS=Number of configured SCell(s) with either both SSB and CSI-RS based L3 measurement configured or only CSI-RS based L3 measurement configuredNote 8: NSCC\_CSIRS\_FR2\_NCM=1 if FR2 SCC, where neighbour cell measurement is required, is with either both SSB and CSI-RS configured or only CSI-RS measurement configured; otherwise, NSCC\_CSIRS\_FR2\_NCM=0.Note 9: NSCC\_SSB=Number of configured SCell(s) with only SSB based L3 measurement configuredNote 10: NPCC\_CCA\_RSSI/CO= 1 if PSCC is configured with RSSI/CO measurements without MG when RMTC and SMTC are overlapping; NSCC\_CCA\_RSSI/CO = Number of MOs for SCell(s) configured with RSSI/CO measurements without MG when RMTC and SMTC are overlapping. |

##### 9.1.5.1.3 NR-DC mode: carrier-specific scaling factor for SSB-based and CSI-RS based L3 measurements performed outside gaps

For UE configured with NR-DC operation, the carrier-specific scaling factor CSSFoutside\_gap,i for intra-frequency SSB-based measurement, inter-frequency SSB-based measurements performed outside measurements gaps and intra-frequency CSI-RS based L3 measurement will be as specified in Table 9.1.5.1.3-1.

Table 9.1.5.1.3-1: CSSFoutside\_gap,i scaling factor for NR-DC mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Scenario | *CSSF*outside\_gap,i for FR1 PCC | *CSSF*outside\_gap,i for FR1 SCC | *CSSF*outside\_gap,i for FR2 PSCC | *CSSF*outside\_gap,i for FR2 SCC where neighbour cell measurement is not required | *CSSF*outside\_gap,i for inter-frequency MO with no measurement gap |
| **FR1 + FR2 NR-DC (FR1 PCell and FR2 PScell) Note 1** | 1+NPCC\_CSIRS  | 2×( NSCC\_SSB +Y+2xNSCC\_CSIRS) | 2x(1+ NPSCC\_CSIRS) Note 2  | 2x(NSCC\_SSB +Y+2x NSCC\_CSIRS ) | 2x(NSCC\_SSB +Y+2x NSCC\_CSIRS ) |
| Note 1: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2. Note 2: CSSFoutside\_gap,i =1 if no SCell is configured and no inter-frequency MO without gap and only SSB based L3 measurement is configured on PSCC; CSSFoutside\_gap,i =2 if no SCell is configured and no inter-frequency MO without gap and either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement is configured on PSCC.Note 3: Y is the number of configured inter-frequency SSB based frequency layers without MG that are being measured outside of MG for CA capable UE; otherwise, it is 0.Note 4: NPCC\_CSIRS=1 if PCC is with either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement configured; otherwise, NPCC\_CSIRS =0.Note 5: NPSCC\_CSIRS=1 if PSCC is with either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement configured; otherwise, NPSCC\_CSIRS =0.Note 6: NSCC\_CSIRS=Number of configured SCell(s) with either both SSB and CSI-RS based L3 measurement configured or only CSI-RS based L3 measurement configuredNote 8: NSCC\_SSB=Number of configured SCell(s) with only SSB based L3 measurement configured |

##### 9.1.5.1.4 NE-DC mode: carrier-specific scaling factor for SSB-based and CSI-RS based measurements performed outside gaps

For UE configured with NE-DC operation, the carrier-specific scaling factor CSSFoutside\_gap,i for intra-frequency SSB-based measurement and inter-frequency SSB-based measurements performed outside measurements gaps and intra-frequency CSI-RS based L3 measurement will be as specified in Table 9.1.5.1.4-1.

Table 9.1.5.1.4-1: CSSFoutside\_gap,i scaling factor for NE-DC mode

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Scenario | *CSSF*outside\_gap,i for FR1 PCC | *CSSF*outside\_gap,i for FR1 SCC | *CSSF*outside\_gap,i for FR2 PCC | *CSSF*outside\_gap,i for FR2 SCC where neighbour cell measurement is required | *CSSF*outside\_gap,i for FR2 SCC where neighbour cell measurement is not required | *CSSF*outside\_gap,i for inter-frequency MO with no measurement gap |
| **NE-DC with FR1 only CA**  | 1+NPCC\_CSIRS  | NSCC\_SSB +Y+2x NSCC\_CSIRS  | N/A | N/A | N/A | NSCC\_SSB +Y+2x NSCC\_CSIRS |
| **NE-DC with FR2 only intra band CA**  | N/A | N/A | 1+NPCC\_CSIRS  | N/A | NSCC\_SSB +Y+2x NSCC\_CSIRS  | NSCC\_SSB +Y+2x NSCC\_CSIRS |
| **NE-DC with****FR2 only inter band CA** | N/A | N/A | 1+NPCC\_CSIRS | 2\*(1+ NSCC\_CSIRS\_FR2\_NCM) Note 3,5 | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) |
| **NE-DC with FR1 +FR2 CA (FR1 PCell) Note 1** | 1+NPCC\_CSIRS  | 2×( NSCC\_SSB +Y+2\* NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM)  | N/A | 2x(1+ NSCC\_CSIRS\_FR2\_NCM) Note 3,5 | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) | 2×( NSCC\_SSB +Y+2x NSCC\_CSIRS -1-NSCC\_CSIRS\_ FR2\_NCM) |
| Note 1: Only one FR1 operating band and one FR2 operating band are included for FR1+FR2 inter-band CA.Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.Note 3: CSSFoutside\_gap,i =1 if only one SCell is configured and no inter-frequency MO without gap and only SSB based L3 measurement is configured on SCC; CSSFoutside\_gap,i =2 if only one SCell is configured and no inter-frequency MO without gap and either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement is configured on SCC.Note 4: Y is the number of configured inter-frequency MOs without MG that are being measured outside of MG for CA capable UE; otherwise, it is 0.Note 5: Only two NR FR2 operating band are included for NE-DC with FR2 only inter-band CA. Note 6: NPCC\_CSIRS=1 if PCC is with either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement configured; otherwise, NPCC\_CSIRS =0.Note 7: NSCC\_CSIRS=Number of configured SCell(s) with either both SSB and CSI-RS based L3 measurement configured or only CSI-RS based L3 measurement configuredNote 8: NSCC\_CSIRS\_FR2\_NCM=1 if FR2 SCC, where neighbour cell measurement is required, is with either both SSB and CSI-RS configured or only CSI-RS measurement configured; otherwise, NSCC\_CSIRS\_FR2\_NCM=0.Note 9: NSCC\_SSB=Number of configured SCell(s) with only SSB based L3 measurement configured |

<End of Change 6>

<Start of Change 7- CR R4-2112515, R4-2115322 and R4-2115323>

## 9.10 CSI-RS based L3 measurements

### 9.10.1 Introduction

This clause contains general requirements on the UE regarding CSI-RS based measurement reporting in RRC\_CONNECTED state. The requirements are split in intra-frequency and inter-frequency measurements requirements.

The requirements in this clause apply, provided:

- Only one MO is configured per CSI-RS frequency layer, and

- all CSI-RS resources in the same MO are configured with the same csi-rs-MeasurementBW, and

- all CSI-RS resources in the same MO are configured with the same periodicity, and

- *associatedSSB* is configured in *CSI-RS-Resource-Mobility* and detectable, and

- the associated SSB is QCLed with the corresponding CSI-RS resources in FR2, and

- the number of CSI-RS resources in any duration that equals to the length of a slot is no larger than UE capability *maxNumberCSI-RS-RRM-RS-SINR*.

### 9.10.2 CSI-RS based intra-frequency measurements

#### 9.10.2.1 Introduction

A measurement is defined as a CSI-RS based intra-frequency measurement provided that:

- the SCS of the CSI-RS resource of the neighbour cell configured for measurement is the same as the SCS of the CSI-RS resource on the serving cell indicated for measurement, and

- the CP type of the CSI-RS resource of neighbour cell configured for measurement is the same as the CP type of the CSI-RS resource of the serving cell indicated for measurement, and

- It is applied for SCS = 60KHz

- the centre frequency of the CSI-RS resource of the neighbour cell configured for measurement is the same as the centre frequency of the CSI-RS resource of the serving cell indicated for measurement

The UE shall be able to identify new intra-frequency cells and perform CSI-RSRP, CSI-RSRQ and CSI-SINR measurements of identified intra-frequency cells if carrier frequency information is provided by PCell or the PSCell.

No measurement gap is needed for intra-frequency CSI-RS resources measurements.

For intra-frequency CSI-RS based measurements, UE may cause scheduling restriction as specified in clause9.10.2.6.

Note: Extended CP for CSI-RS based measurement is not supported in this release.

#### 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, and

- The gap between two 5ms windows is half of the CSI-RS periodicity.

- 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 is determined by an offset of half of the CSI-RS periodicity in slots with regards to the starting point of the first 5ms 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.

#### 9.10.2.3 Number of cells and number of CSI-RS

##### 9.10.2.3.1 Requirements for FR1

For each intra-frequency CSI-RS layer, during each layer 1 measurement period, the UE shall be capable of performing CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements for at least:

- 32 CSI-RSs with different CSI-RS index and/or PCI on the intra-frequency layer, and

- the cells to be monitored based on CSI-RS are the same set or a subset of the cells monitored based on the layer of the associated SSB

##### 9.10.2.3.2 Requirements for FR2

For one single intra-frequency CSI-RS layer in a band, during each layer 1 measurement period, the UE shall be capable of performing CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements for at least:

- 32 CSI-RSs with different CSI-RS index and/or PCI, and

- the cells to be monitored based on CSI-RS are the same set or a subset of the cells monitored based on the layer of the associated SSB.

where this single intra-frequency layer shall be:

- PCC on which UE is configured to report CSI-RS measurement when UE is configured with SA NR operation mode with PCC in the band; or

- PSCC on which UE is configured to report CSI-RS measurement when UE is configured with EN-DC with PSCC in the band; or

- One of the SCCs on which UE is configured to report CSI-RS based measurements when neither PCC nor PSCC is in the same band, so that the selected SCC shall be an SCC where the UE is configured with CSI-RSRP measurement reporting if such SCC exists, otherwise the selected SCC is determined by UE implementation.

The UE shall also be capable of performing CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements for at least 2 CSI-RSs on serving cell for each of the other intra-frequency layer(s) in the same band.

For each FR2 band, UE is only required to measure neighbour cell CSI-RS on the CSI-RS layer, whose associated SSB should be on the same SSB layer as the one where UE is required to measure neighbour cell SSB.

#### 9.10.2.4 Measurement Reporting Requirements

##### 9.10.2.4.1 Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodic measurement reports shall meet the requirements in clauses 10.1.2.3, 10.1.3.3, 10.1.7.2, 10.1.8.2, 10.1.12.2 and 10.1.13.2.

##### 9.10.2.4.2 Event-triggered Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.1.2.3, 10.1.3.3, 10.1.7.2, 10.1.8.2, 10.1.12.2 and 10.1.13.2.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.10.2.4.3.

##### 9.10.2.4.3 Event Triggered Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI- SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.2.3, 10.1.3.3, 10.1.7.2, 10.1.8.2, 10.1.12.2 and 10.1.13.2.

The UE shall not send any event triggered measurement reports as long as no reporting criterion is fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTIDCCH. This measurement reporting delay excludes a delay which caused by no UL resources being available for UE to send the measurement report on.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than the CSI-RS based measurement defined in clause 9.10.2.5. When L3 filtering is used an additional delay can be expected.

#### 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-SR 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 intrafrequency 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 intrafrequency 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 intrafrequency 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)).

#### 9.10.2.6 Scheduling availability of UE during CSI-RS based intra-frequency measurements

UE is required to be capable of measuring without measurement gaps when CSI-RS resources are completely contained in the active BWP of the UE. Note the configured CSI-RS symbol is indicated in *firstOFDMSymbolInTimeDomain* included in *CSI-RS-ResourceConfigMobility* for RRM. When UE is required to perform CSI-RS based RRM measurements, and any of the conditions in the following clauses is met, there are restrictions on the scheduling availability; otherwise, there is no scheduling restriction. Note same numerology for intra-frequency CSI-RS and data of serving cell is considered in this release.

##### 9.10.2.6.1 Scheduling availability of UE performing CSI-RS based measurements in TDD bands

When UE performs CSI-RS intra-frequency measurements in a TDD band,

- UE is not expected to transmit PUCCH/PUSCH/SRS on configured CSI-RS resource symbols, and on 1 OFDM symbol before and after each consecutively configured CSI-RS symbols.

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.

##### 9.10.2.6.2 Scheduling availability of UE performing CSI-RS based measurements in FR2

When the UE performs CSI-RS based intra-frequency measurements for L3 mobility management in FR2, the following restrictions apply.

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on the configured CSI-RS symbol within the configured slot as indicated in *slotConfig* of the corresponding CSI-RS resource to be measured for mobility.

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 CSI-RSRP, CSI-RSRQ or CSI-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.

### 9.10.3 CSI-RS based Inter-frequency measurements

#### 9.10.3.1 Introduction

A measurement is defined as a CSI-RS based inter-frequency measurement provided it is not defined as an intra-frequency measurement according to clause 9.10.2.

If a UE is configured with the higher layer parameter *CSI-RS-Resource-Mobility* and the higher layer parameter *associatedSSB* is configured, the UE shall be able to identify inter-frequency cells indicated for measurement and perform CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements of identified inter-frequency cells.

When measurement gaps are needed, the UE is not expected to detect the associated SSB nor perform measurement of the CSI-RS resource configured in *CSI-RS-Resource-Mobility* on an inter-frequency measurement object which start earlier than the gap starting time + switching time, and ends later than the gap end – switching time. When the inter-frequency cells are in FR2 and the per-FR gap is configured to the UE in EN-DC, SA NR, NE-DC and NR-DC, or the serving cells are in FR2, the inter-frequency cells are in FR2 and the per-UE gap is configured to the UE in SA NR and NR-DC, the switching time is 0.25ms. Otherwise the switching time is 0.5ms.

#### 9.10.3.2 Requirements applicability

The associated SSB layer of the CSI-RS follows the same requirements as SSB based measurements defined in 9.3.

The requirements in clause 9.10.3 apply, provided:

- The associated SSB of the cell being identified or measured is detectable, and

- All CSI-RS resources on one inter-frequency layer are configured within a window of up to 5ms, and

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

- CSI-RS resources for measurements and the associated SSB for cell identification are configured within measurement gap.

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

- SS-RSRP related side conditions given in clauses 10.1.4.1 and 10.1.5.1 for FR1 and FR2, respectively, for a corresponding Band,

- SS-RSRQ related side conditions given in clauses 10.1.9.1 and 10.1.10.1 for FR1 and FR2, respectively, for a corresponding Band,

- SS-SINR related side conditions given in clauses 10.1.14.1 and 10.1.15.1 for FR1 and FR2, respectively, for a corresponding Band,

- SSB\_RP and SSB Ês/Iot according to Annex B.2.3 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 10.1.4.3 and 10.1.5.3 for FR1 and FR2, respectively, for a corresponding Band,

- CSI-RSRQ related side conditions given in clauses 10.1.9.2 and 10.1.10.2 for FR1 and FR2, respectively, for a corresponding Band,

- CSI-SINR related side conditions given in clauses 10.1.14.2 and 10.1.15.2 for FR1 and FR2, respectively, for a corresponding Band,

- CSI \_RP and CSI-RS Ês/Iot according to Annex B.2.13 for a corresponding Band.

#### 9.10.3.3 Number of cells and number of CSI-RS resources

##### 9.10.3.3.1 Requirements for FR1

For each inter-frequency CSI-RS layer, during each layer 1 measurement period, the UE shall be capable of performing CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements for at least:

- 14 CSI-RSs with different CSI-RS index and/or PCI , and

- The cells to be monitored based on CSI-RS are the same set or a subset of the cells monitored based on the layer of the associated SSB.

##### 9.10.3.3.2 Requirements for FR2

For each inter-frequency CSI-RS layer, during each layer 1 measurement period, the UE shall be capable of performing CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements for at least:

- 24 CSI-RSs with different CSI-RS index and/or PCI, and

- The cells to be monitored based on CSI-RS are the same set or a subset of the cells monitored based on the layer the associated SSB.

#### 9.10.3.4 Measurements reporting requirements

##### 9.10.3.4.1 Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.2, 10.1.5.2, 10.1.9.2, 10.1.10.2, 10.1.14.2 and 10.1.15.2.

##### 9.10.3.4.2 Event-triggered Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.2, 10.1.5.2, 10.1.9.2, 10.1.10.2, 10.1.14.2 and 10.1.15.2.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.10.3.4.3.

##### 9.10.3.4.3 Event-triggered Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.2, 10.1.5.2, 10.1.9.2, 10.1.10.2, 10.1.14.2 and 10.1.15.2.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 × TTIDCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within CSI-RS based measurement defined in clause 9.10.3.5.When L3 filtering is used an additional delay can be expected.

#### 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 (Frequency 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 3.6.1NOTE 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 (Frequency 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 3.6.1NOTE 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(Frequency 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 3.6.1NOTE 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 R4-2115420>

#### A.6.1.2.3 Cell reselection to lower priority E-UTRAN for UE fulfilling low mobility relaxed measurement criterion

##### A.6.1.2.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection when UE fulfills the low mobility criterion specified in clause 4.2.2.11.2 and the E-UTRAN cell is of lower priority.

##### A.6.1.2.3.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.3.2-1, A.6.1.2.3.2-2, A.6.1.2.3.2-3 and A.6.1.2.3.2-4. 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.

As specified in the Test Purpose, the UE is configured with the relaxed measurement criterion for UE with low mobility defined in clause 5.2.4.9.1 in [1]. So, Cell 1 configures the UE as follows:

- *lowMobilityEvalutation* [2] criterion is configured according to the parameters listed in Table A.6.1.2.3.2-3;

- *cellEdgeEvaluation* [2] criterion is not configured;

- *combineRelaxedMeasCondition* [2] is not configured

Table A.6.1.2.3.2-1: 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.6.1.2.3.2-2: General test parameters for NR to E-UTRAN cell re-selection test case for UE fulfilling low mobility criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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, it fulfills Low Mobility relaxation measurements criterion, and during T1 period the UE reselects to cell 2 |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6 | Cell2 |
| 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 with higher priority 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 | 0.64 | The value shall be used for all cells in the test. |
| NR PRACH configuration index |  | 1, 2, 3, 4, 5, 6 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index |  | 1, 2, 3 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
|  |  | 4, 5, 6 | 4 |  |
| T1 | s | 1, 2, 3, 4, 5, 6 | 24 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | s | 1, 2, 3, 4, 5, 6 | 24 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.6.1.2.3.2-3: 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  |  | 1, 4 | CR.1.1 FDD |
| configuration |  | 2, 5 | CR.1.1 TDD |
|  |  | 3, 6 | CR.2.1 TDD |
| Dedicated CORESET RMC  |  | 1, 4 | CCR.1.1 FDD |
| configuration |  | 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 |
| TreselectionP | S | 1, 2, 3, 4, 5, 6 | 0 |
| Snonintrasearch | dB | 1, 2, 3, 4, 5, 6 | 50 |
| Threshx, highP | dB | 1, 2, 3, 4, 5, 6 | 48 |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6 | 44 |
| Threshx, lowP (Note 2) | dB | 1, 2, 3, 4, 5, 6 | 50 |
| SSearchDeltaP  | dB | 1, 2, 3, 4, 5, 6 | 3 |
| TSearchDeltaP  | s | 1, 2, 3, 4, 5, 6 | 5 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: This refers to the value of Thresh**x, low** which is included in NR system information, and is a threshold for the E-UTRA target cell |

**Table A.6.1.2.3.2-4: 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 |
| Snonintrasearch | dB | Not sent |
| Threshx, high (Note 2) | dB | 48 |
| Threshserving, low | dB | 44 |
| Threshx, low  | dB | 50 |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell |

##### A.6.1.2.3.3 Test Requirements

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

The cell re-selection delay to a lower priority cell shall be less than 17 s.

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

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

Where:

Tevaluate, E-UTRAN See Table 4.2.2.11.2-1 in clause 4.2.2.11.2

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

This gives a total of 15.36 (Tevaluate, E-UTRAN) + 1.28 (TSI-E-UTRA) = 16.64 s, allow 17 s for the cell re-selection delay to a lower priority E-UTRAN cell for UE fulfilling low mobility criterion.

#### A.6.1.2.4 Cell reselection to lower priority E-UTRAN for UE fulfilling not-at-cell edge relaxed measurement criterion

##### A.6.1.2.4.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements when UE fulfills not-at-cell edge criterion specified in clause 4.2.2.11.3 when the E-UTRAN cell is of lower priority.

##### A.6.1.2.4.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.4.2-1, A.6.1.2.4.2-2, A.6.1.2.4.2-3 and A.6.1.2.4.2-4. 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.

As specified in the Test Purpose, the UE is configured with the relaxed measurement criterion for UE with not-at-cell edge defined in clause 5.2.4.9.2 in [1]. So, Cell 1 configures the UE as follows:

- *lowMobilityEvalutation* [2] criterion is not configured;

- *cellEdgeEvaluation* [2] criterion is configured according to the parameters listed in Table A.6.1.2.4.2-3;

- *combineRelaxedMeasCondition* [2] is not configured

Table A.6.1.2.4.2-1: 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.6.1.2.4.2-2: General test parameters for NR to E-UTRAN cell re-selection test case for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2, 3, 4, 5, 6 | Cell1 | The UE camps on cell 1 in the initial phase and fulfill the not at the cell edge criteria. |
| Neighbour cells |  | 1, 2, 3, 4, 5, 6 | Cell2 |
| 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 | 0.64 | The value shall be used for all cells in the test. |
| NR PRACH configuration index |  | 1, 2, 3, 4, 5, 6 | 102 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| E-UTRAN PRACH configuration index |  | 1, 2, 3 | 53 | As specified in table 5.7.1-2 in TS 36.211 [23] |
|  |  | 4, 5, 6 | 4 |  |
| T1 | s | 1, 2, 3, 4, 5, 6 | 24 | T1 needs to be defined so that cell re-selection reaction time is taken into account. |
| T2 | s | 1, 2, 3, 4, 5, 6 | 24 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |

Table A.6.1.2.4.2-3: 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  |  | 1, 4 | CR.1.1 FDD |
| configuration |  | 2, 5 | CR.1.1 TDD |
|  |  | 3, 6 | CR.2.1 TDD |
| Dedicated CORESET RMC  |  | 1, 4 | CCR.1.1 FDD |
| configuration |  | 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 |  |  |
|  |  |  |  |  |
|  |  |  |
| SSearchThresholdP | dB | 1, 2, 3, 4, 5, 6 | 32 | 32 |
| 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 | 60 |
| Threshx, highP | dB | 1, 2, 3, 4, 5, 6 | 48 |
| Threshserving, lowP | dB | 1, 2, 3, 4, 5, 6 | 44 |
| Threshx, lowP (Note 2) | dB | 1, 2, 3, 4, 5, 6 | 50 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: This refers to the value of Thresh**x, low** which is included in NR system information, and is a threshold for the E-UTRA target cell |

Table A.6.1.2.4.2-4: 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 |
| Snonintrasearch | dB | Not sent |
| Threshx, high (Note 2) | dB | 48 |
| Threshserving, low | dB | 44 |
| Threshx, low  | dB | 50 |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: This refers to the value of Thresh**x, high** which is included in E-UTRA system information, and is a threshold for the NR target cell |

##### A.6.1.2.4.3 Test Requirements

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

The cell re-selection delay to a lower priority cell shall be less than 17s.

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

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

Where:

Tevaluate, E-UTRAN See Table 4.2.2.11.3-1 in clause 4.2.2.11.3

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

This gives a total of 16.64 s, allow 17 s for the cell re-selection delay to a lower priority E-UTRAN cell for UE fulfilling not-at-cell edge criterion.

<End of Change 8>

<Start of Change 9-CR R4-2115326>

========================= First Change Request ===========================

#### A.7.1.1.3 Cell reselection to FR2 intra-frequency NR case for UE fulfilling low mobility relaxed measurement criterion

##### A.7.1.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with relaxed measurement criterion specified in clause 4.2.2.9.2.

##### A.7.1.1.3.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.3.2-1, A.7.1.1.3.2-2 and A.7.1.1.3.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. During T1 and T2, only criteria *lowMobilityEvalutation* is configured andfulfilled, where (SrxlevRef – Srxlev) < SSearchDeltaP.UE has not registered with network for the tracking area containing cell2.

Table A.7.1.1.3.2-1: Supported test configurations

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

Table A.7.1.1.3.2-2: General test parameters for FR2 intra-frequency NR cell re-selection test case for UE fulfilling low mobility criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 | The UE camps on cell 1 in the initial phase |
|  | Neighbour cells |  | 1, 2 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2 | Cell2 | The UE reselects to cell 2 during T1 period |
|  | Neighbour cells |  | 1, 2 | Cell1 |
| Final condition | Active cell |  | 1, 2 | Cell1 | The UE reselects to cell 1 during T2 period |
| Neighbour cells |  | 1,2 | Cell2 |  |
| RF Channel Number |  | 1, 2 | 1 |  |
| Time offset between cells |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | s | 1, 2 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell |  | 1, 2 | Not configured |  |
| T1 | s | 1, 2 | 100 |  |
| T2 | s | 1, 2 | 100 |  |

Table A.7.1.1.3.2-3: Cell specific test parameters for FR2 intra-frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | Cell 2 |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC  |  | 1 | SR.3.1 TDD | SR.3.1 TDD |
| configuration |  | 2 | SR.3.1 TDD | SR.3.1 TDD |
| RMSI CORESET  |  | 1 | CR.3.1 TDD | CR.3.1 TDD |
| RMC configuration |  | 2 | CR.3.1 TDD | CR.3.1 TDD |
| Dedicated CORESET  |  | 1 | CCR.3.1 TDD | CCR.3.1 TDD |
| RMC configuration |  | 2 | CCR.3.1 TDD | CCR.3.1 TDD |
| SSB configuration |  | 1 | SSB.3 FR2 | SSB.7 FR2 |
|  |  | 2 | SSB.4 FR2 | SSB.8 FR2 |
| OCNG Pattern |  | 1, 2 | OP.4 | OP.4 |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | DLBWP.0.1 |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | ULBWP.0.1 |
| RLM-RS |  | 1, 2 | SSB | SSB |
| Qrxlevmin | dBm/SCS | 1 | -140 | -140 |
|  |  | 2 | -137 | -137 |
| SSearchDeltaP | dB | 1, 2 | 6 | 6 |
| TSearchDeltaP | s | 1,2 | 5 | 5 |
| Pcompensation | dB | 1, 2 | 0 | 0 |
| Qhysts | dB | 1, 2 | 0 | 0 |
| Qoffsets, n | dB | 1, 2 | 0 | 0 |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | SS-RSRP |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | Setup 1 defined in A.3.15.1 |
| Beam assumptionNote 4 |  | 1,2 | Rough | Rough |
|  | dB | 1 | -3 | 1.5 | 1.5 | -3 |
|  |  | 2 |
|  Note2 | dBm/SCS | 1 | -93 |
|  |  | 2 | -90 |
|  Note2 | dBm/15 kHz | 1 | -102 |
|  |  | 2 |  |
|  | dB | 1 | -3 | 1.5 | 1.5 | -3 |
|  |  | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -96 | -91.5 | -91.5 | -96 |
|  |  | 2 | -93 | -88.5 | -88.5 | -93 |
| Io on SSB symbols of each cell | dBm/95.04 MHz | 1 | -63.40 | -62.47 | -62.47 | -63.40 |
| 2 | -62.86 | -61.67 | -61.67 | -62.86 |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 |
| SintrasearchP | dB | 1, 2 | 50 | 50 |
| Propagation Condition  |  | 1, 2 | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

##### A.7.1.1.3.3 Test Requirements

The cell reselection delay to an already detected cell for UE fulfilling low mobility relaxed criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected cell shall be less than 79 s.

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

NOTE: The cell re-selection delay to an already detectable cell can be expressed as: Tevaluate, NR\_Intra + TSI-NR,

Where:

 Tevaluate, NR\_Intra See Table 4.2.2.9.2-1 in clause 4.2.2.9,

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

This gives a total of 78.08 s, allow 79s for the cell re-selection delay to an already detected cell for UE fulfilling low mobility criterion in the test case.

========================= Second Change Request ===========================

#### A.7.1.1.4 Cell reselection to FR2 intra-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

##### A.7.1.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with relaxed measurement criterion specified in clause 4.2.2.9.3.

##### A.7.1.1.4.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.4.2-1, A.7.1.1.4.2-2 and A.7.1.1.4.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. During T1 and T2, only criteria *cellEdgeEvaluation* is configured andfulfilled, where Srxlev > SSearchThresholdP.UE has not registered with network for the tracking area containing cell2.

Table A.7.1.1.4.2-1: Supported test configurations

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

Table A.7.1.1.4.2-2: General test parameters for FR2 intra-frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell1 | The UE camps on cell 1 in the initial phase |
|  | Neighbour cells |  | 1, 2 | Cell2 |  |
| T1 end condition | Active cell |  | 1, 2 | Cell2 | The UE reselects to cell 2 during T1 period |
|  | Neighbour cells |  | 1, 2 | Cell1 |
| Final condition | Active cell |  | 1, 2 | Cell1 |  |
| Neighbour cells |  | 1,2 | Cell2 |  |
| RF Channel Number |  | 1, 2 | 1 |  |
| Time offset between cells |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SMTC configuration |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | s | 1, 2 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell |  | 1, 2 | Not configured |  |
| T1 | s | 1, 2 | 100 |  |
| T2 | s | 1, 2 | 100 |  |

Table A.7.1.1.4.2-3: Cell specific test parameters for FR2 intra-frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | Cell 2 |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC  |  | 1 | SR.3.1 TDD | SR.3.1 TDD |
| configuration |  | 2 | SR.3.1 TDD | SR.3.1 TDD |
| RMSI CORESET  |  | 1 | CR.3.1 TDD | CR.3.1 TDD |
| RMC configuration |  | 2 | CR.3.1 TDD | CR.3.1 TDD |
| Dedicated CORESET  |  | 1 | CCR.3.1 TDD | CCR.3.1 TDD |
| RMC configuration |  | 2 | CCR.3.1 TDD | CCR.3.1 TDD |
| SSB configuration |  | 1 | SSB.3 FR2 | SSB.7 FR2 |
|  |  | 2 | SSB.4 FR2 | SSB.8 FR2 |
| OCNG Pattern |  | 1, 2 | OP.4 | OP.4 |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | DLBWP.0.1 |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | ULBWP.0.1 |
| RLM-RS |  | 1, 2 | SSB | SSB |
| Qrxlevmin | dBm/SCS | 1 | -140 | -140 |
|  |  | 2 | -137 | -137 |
| Pcompensation | dB | 1, 2 | 0 | 0 |
| Qhysts | dB | 1, 2 | 0 | 0 |
| Qoffsets, n | dB | 1, 2 | 0 | 0 |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | SS-RSRP |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | Setup 1 defined in A.3.15.1 |
| Beam assumptionNote 4 |  | 1,2 | Rough | Rough |
|  | dB | 1 | -3 | 1.5 | 1.5 | -3 |
|  |  | 2 |
|  Note2 | dBm/SCS | 1 | -93 |
|  |  | 2 | -90 |
|  Note2 | dBm/15 kHz | 1 | -102 |
|  |  | 2 |  |
|  | dB | 1 | -3 | 1.5 | 1.5 | -3 |
|  |  | 2 |
| SS-RSRP Note3 | dBm/SCS | 1 | -96 | -91.5 | -91.5 | -96 |
|  |  | 2 | -93 | -88.5 | -88.5 | -93 |
| Io on SSB symbols of each cell | dBm/95.04 MHz | 1 | -63.40 | -62.47 | -62.47 | -63.40 |
| 2 | -62.86 | -61.67 | -61.67 | -62.86 |
| Treselection | s | 1, 2 | 0 | 0 | 0 | 0 |
| SSearchThresholdP |  | 1, 2 | 35 | 35 | 35 | 35 |
| SintrasearchP | dB | 1, 2 | 50 | 50 |
| Propagation Condition  |  | 1, 2 | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

##### A.7.1.1.4.3 Test Requirements

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 79 s.

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

NOTE: The cell re-selection delay to an already detected cell can be expressed as: Tevaluate, NR\_Intra + TSI-NR,

Where:

 Tevaluate, NR\_Intra See Table 4.2.2.9.3-1 in clause 4.2.2.9,

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

This gives a total of 78.08 s, allow 79s for the cell re-selection delay to an already detected cell for UE fulfilling not-at-cell edge criterion in the test case.

========================= Third Change Request ===========================

#### A.7.1.1.6 Cell reselection to FR2 inter-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

##### A.7.1.1.6.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling not-at-cell edge criterion specified in clause 4.2.2.10.3.

##### A.7.1.1.6.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.7.1.1.6.2-1, A.7.1.1.6.2-2 and A.7.1.1.6.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with *cellEdgeEvaluation* criterion [2].

Table A.7.1.1.6.2-1: Supported test configurations

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

Table A.7.1.1.6.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell2 | The UE camps on cell2 and fulfils not-at-cell edge (*cellEdgeEvaluation* [2]) criterion. |
|  | Neighbour cell |  | 1, 2 | Cell1 |  |
| T1 final condition | Active cell |  | 1, 2 | Cell1 | The UE reselects to low priority cell1 during T1 |
| Neighbour cell |  | 1, 2 | Cell2 |  |
| T2 final condition | Active cell |  | 1, 2 | Cell2 | The UE reselects to high priority cell2 during T2 |
| Neighbour cell |  | 1, 2 | Cell1 |
| RF Channel Number |  | 1, 2 | 1, 2 |  |
| Time offset between cells |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SSB configuration |  | 1 | SSB.1 FR2 |  |
|  | 2 | SSB.2 FR2 |  |
| SMTC configuration |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | s | 1, 2 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell |  | 1, 2 | Not configured |  |
| T1 | s | 1, 2 | 85 | T1 needs to be long enough to allow cell re-selection to already known cell. |
| T2 | s | 1, 2 | 85 | T2 needs to be long enough to allow cell re-selection to already known cell. |

Table A.7.1.1.6.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | Cell 2 |
|  |  |  | T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | SR.3.1 TDD |
| RMSI CORESET parameters |  | 1, 2 | CR.3.1 TDD | CR.3.1 TDD |
| RMSI CORESET RMC configuration  |  | 1, 2 | CCR.3.1 TDD | CCR.3.1 TDD |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | OP.1 defined in A.3.2.1 |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | DLBWP.0.1 |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | ULBWP.0.1 |
| RLM-RS |  | 1, 2 | SSB | SSB |
| Qrxlevmin | dBm/SCS | 1 | -140 | -140 |
|  |  | 2 | -137 | -137 |
| Pcompensation | dB | 1, 2 | 0 | 0 |
| Qhysts | dB | 1, 2 | 0 | 0 |
| Qoffsets, n | dB | 1, 2 | 0 | 0 |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | SS-RSRP |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | Setup 1 defined in A.3.15.1 |
| Beam assumptionNote 4 |  | 1, 2 | Rough | Rough |
|  | dB | 1, 2 | 8 | 8 | -3 | 8 |
|  Note2 | dBm/SCS | 1 | -93 | -93 |
| 2 | -90 | -90 |
|  Note2 | dBm/15 kHz | 1, 2 | -102 | -102 |
|  | dB | 1, 2 | 8 | 8 | -3 | 8 |
| SS-RSRP Note3 | dBm/SCS | 1 | -85 | -85 | -96 | -85 |
|  |  | 2 | -82 | -82 | -93 | -82 |
| Io | dBm/95.04 MHz | 1 | -55.37 | -55.37 | -62.25 | -55.37 |
|  |  | 2 | -52.37 | -52.37 | -59.25 | -52.37 |
| SSearchThresholdP |  | 1, 2 | 35 | 35 | 35 | 35 |
| TreselectionNR | s | 1, 2 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2 | 50 | Not sent |
| Threshx, high | dB | 1, 2 | 48 | 48 |
| Threshserving, low | dB | 1, 2 | 44 | 44 |
| Threshx, low  | dB | 1, 2 | 50 | 50 |
| Propagation Condition  |  | 1, 2 | AWGN | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

##### A.7.1.1.6.3 Test Requirements

The cell reselection delay to an already detected low priority cell (Cell 1) for UE fulfilling not-at-cell edge criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 79 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling not-at-cell edge criterion is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 79 s.

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

NOTE 1: The cell re-selection delay to an already detected low priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

NOTE 2: The cell re-selection delay to an already detected higher priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

Where:

Tevaluate, NR\_ inter See Table 4.2.2.10.3-1 in clause 4.2.2.10.3

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

This gives a total of 78.8 s, allow 79 s for the cell re-selection delay to an already detected low priority cell for UE fulfilling not-at-cell edge criterion in the test case.

This gives a total of 78.08 s, allow 79 s for the cell re-selection delay to an already detected high priority cell for UE fulfilling not-at-cell edge criterion in the test case.

<End of Change 9>