**3GPP TSG-RAN WG4 Meeting #98bis-e *R4-2105707***

**Electronic Meeting, April 12 − April 20, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **36.133** | **CR** | **draftCR** | **rev** | **1** | **Current version:** | **16.9.0** |  |
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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:*** | Terminology updates for NR-U in 36.133 | | | | | | | | | |
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| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_unlic-Core | | | | |  | ***Date:*** | | | 2021-04-02 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Square brackets remaining | | | | | | | | |
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| ***Summary of change:*** | | Remove square brackets | | | | | | | | |
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| ***Consequences if not approved:*** | | Square brackets remaining | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 8.1.2.4.21A, 8.17.2.2.a, 8.17.4A.1.1, 8.17.4A.1.2 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 36.521-3 | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Revised from R4-2102521 | | | | | | | | |

**--- start of change 1 ---**

##### 8.1.2.4.21A E-UTRAN FDD – NR measurements when CCA is used

Requirements in this clause shall apply for NR capable UE, when NR is in carrier frequencies with CCA and not configured with EN-DC.

The UE shall be able to identify new RAT E-UTRAN FDD-NR cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-RAT cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided.

In the requirements of clause 8.1.2.4.21A, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the first two successive candidate SSB positions for the same SS/PBCH block index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding period; otherwise the SMTC occasion is considered as available at the UE.

8.1.2.4.21A.1 E-UTRAN FDD – NR measurements

8.1.2.4.21A.1.1 Identification of a new NR cell

When measurement gaps are scheduled, the UE shall be able to identify a new detectable cell within Tidentify\_irat\_cca\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise, UE shall be able to identify a new detectable inter-RAT frequency cell within Tidentify\_irat\_cca\_with\_index. The UE shall be able to identify a new detectable inter-RAT frequency SSB of an already detected cell within Tidentify\_irat\_cca\_without\_index.

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

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

Where:

TPSS/SSS\_sync\_irat\_cca: it is the time period used in PSS/SSS detection given in table 8.1.2.4.21A.1.1-1.

TSSB\_time\_index\_irat\_cca: it is the time period used to acquire the index of the SSB being measured given in table 8.1.2.4.21A.1.1-2.

T SSB\_measurement\_period\_irat\_cca: equal to a measurement period of SSB based measurement given in table 8.1.2.4.21A.1.1-3.

Nfreq is defined in clause 8.1.2.1.1.

Table 8.1.2.4.21A.1.1-1: Time period for PSS/SSS detection, in NR carrier frequencies with CCA

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | TPSS/SSS\_sync\_irat\_cca |
| No DRX | Max(600ms, (8 +LPSS/SSS,gaps)  × Max(MGRP, SMTC period)) × Nfreq |
| DRX cycle ≤ 320ms | Max(600ms, Ceil((8+LPSS/SSS,gaps) ×1.5) × Max(MGRP, SMTC period, DRX cycle)) × Nfreq |
| DRX cycle > 320ms | (8+LPSS/SSS,gaps) × DRX cycle × Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1 of TS 38.133 [50].  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: LPSS/SSS,gaps is the number of SMTC occasions not available at the UE during TPSS/SSS\_sync\_irat\_cca, where LPSS/SSS,gaps ≤ LPSS/SSS,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 4: LPSS/SSS,gaps = 12 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms LPSS/SSS,gaps = 8 for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and LPSS/SSS,gaps = 5 for DRX cycle > 320 ms. | |

Upon exceeding LPSS/SSS,gaps,max, the UE is not required to meet the corresponding PSS/SSS detection requirement. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

Table 8.1.2.4.21A.1.1-2: Time period for time index detection, in NR carrier frequencies with CCA

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | TSSB\_time\_index\_irat\_cca |
| No DRX | Max(120ms, (3 + Lind,gaps)  × Max(MGRP, SMTC period)) × Nfreq |
| DRX cycle ≤ 320ms | Max(120ms, ceil((3+ Lind,gaps)  x 1.5) × Max(MGRP, SMTC period, DRX cycle)) × Nfreq |
| DRX cycle > 320ms | (3+ Lind,gaps) × DRX cycle × Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1 of TS 38.133 [50]  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: Lind,gaps is the number of SMTC occasions not available at the UE during TSSB\_time\_index\_irat\_cca, where Lind,gaps ≤ Lind,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 4: Lind,gaps,max = 5 for Max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lind,gaps,max = 3 for Max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lind,gaps,max = 2 for DRX cycle > 320 ms. | |

The UE shall restart the time index detection upon exceeding Lind,gaps,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

In the requirements, an NR cell is considered to be detectable when:

- NR SS-RSRP related conditions in the accuracy requirements in Section TBD are fulfilled for a corresponding Band, together with the corresponding side conditions in TBD of TS 38.133 [50],

- NR SS-RSRQ related conditions in the accuracy requirements in Section TBD are fulfilled for a corresponding Band, together with the corresponding side conditions in TBD of TS 38.133 [50],

- NR SS-SINR related conditions in the accuracy requirements in Section TBD are fulfilled for a corresponding Band, together with the corresponding side conditions in TBD of TS 38.133 [50].

When measurement gaps are scheduled for NR measurements the UE physical layer shall be capable of reporting NR SS-RSRP, SS-RSRQ, and SS-SINR measurements to higher layers with measurement accuracy as specified in clause TBD, with measurement period as shown in table 8.1.2.4.21A.1.1-3:

Table 8.1.2.4.21A.1.1-3: Measurement period for inter-RAT measurements

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | T SSB\_measurement\_period\_irat\_cca |
| No DRX | Max(200ms, (8+ Lmeas) × Max(MGRP, SMTC period)) × Nfreq |
| DRX cycle ≤ 320ms | Max(200ms, ceil((8+ Lmeas) x 1.5) × Max(MGRP, SMTC period, DRX cycle)) × Nfreq |
| DRX cycle > 320ms | (8+ Lmeas) × DRX cycle × Nfreq |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1 of TS 38.133 [50]  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: Lmeas is the number of SMTC occasions not available at the UE during T SSB\_measurement\_period\_irat\_cca, where Lmeas ≤ Lmeas,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 4:   Lmeas,max = 12 for Max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lmeas,max = 8 for Max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lmeas,max = 5 for DRX cycle > 320 ms. | |

The UE shall restart the measurement upon exceeding Lmeas,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

When the time period of unsuccessful measurement attemps due to exceeding the maximum number of unavailable at the UE SMTC occasions of an already identified cell exceeds the maximum time requirement for the cell to remain known defined in clause 9.3A.6.3, the UE shall stop the measurement attempts on this SSB and perform the detection procedure again, like for any other SSB.

The UE shall be capable of performing SSB based SS-RSRP, SS-RSRQ, and SS-SINR for up to [7] NR carrier frequencies.

For each RAT E-UTRAN FDD-NR layer on, in carrier frequencies with CCA, the UE shall be capable of monitoring at least 4 cells.

For each RAT E-UTRAN FDD-NR layer in carrier frequencies with CCA, during each layer 1 measurement period, the UE shall be capable of monitoring at least 7 SSBs with different SSB indexes and/or PCI on the RAT E-UTRAN FDD-NR layer.

The NR SS-RSRP measurement accuracy for all measured cells shall be as specified in clause TBD. The NR SS-RSRQ measurement accuracy for all measured cells shall be as specified in clause TBD. The NR SS-SINR measurement accuracy for all measured cells shall be as specified in clause TBD.

8.1.2.4.21A.1.2 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

8.1.2.4.21A.1.3 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

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

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu 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 twice the TTI of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report and all delays due to UL CCA failures until the successful transmission of the report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than Tidentify\_irat\_cca\_without\_index or Tidentify\_irat\_cca\_with\_index defined in Clause 8.1.2.4.21A.1.1 for the minimum requirements.When L3 filtering is used or IDC autonomous denial or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period Tidentify\_irat\_cca\_without\_index or Tidentify\_irat\_cca\_with\_index defined in clause 8.1.2.4.21A.1.1 for the minimum requirements and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than Tmeasurement\_NR\_cca\_FDD defined in clause 8.1.2.4.21A.1.1 provided the timing to that cell has not changed more than ±3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

8.1.2.4.21A.1.4 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.21A.1.3.

8.1.2.4.21A.1.5 NR inter-RAT RSSI measurements

The UE physical layer shall be capable of performing the RSSI measurements, defined in TS 38.215 [58], on one or more inter-RAT carriers operating with CCA, TS 37.213 [57], if the carrier(s) are indicated by higher layers [38], and reporting the RSSI measurements to higher layers. The UE physical layer shall provide to higher layers a single RSSI sample for each OFDM symbol within each configured RSSI measurement duration [38] occurring with a configured RSSI measurement timing configuration periodicity, *rmtc-Periodicity,* according to [38].

Table 8.1.2.4.21A.1.5-1: Measurement period for inter-RAT RSSI measurements with gaps

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | T RSSI\_measurement\_period\_NR\_cca |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFNR,EN-DC) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x CSSFNR,EN-DC) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]. | |

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

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

The RSSI measurement performed and reported according to this section shall meet the RSSI measurement accuracy requirement in Section TBD in TS 38.133 [50].

8.1.2.4.21A.1.6 NR inter-RAT channel occupancy measurements

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

**Table 8.1.2.4.21A.1.6-1: Measurement period for inter-RAT Channel Occupancy measurements with gaps**

|  |  |
| --- | --- |
| **Condition NOTE1,2,3,4** | **T CO\_measurement\_period\_NR\_cca** |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFNR,EN-DC) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x CSSFNR,EN-DC) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]. | |

If the UE requires measurement gaps to perform inter-frequency measurements, a single measurement gap pattern is used for all concurrent inter-frequency measurements, including inter-frequency channel occupancy measurements.

The channel occupancy measurement performed and reported according to this section shall meet the channel occupancy measurement accuracy requirements in Section TBD of TS 38.133 [50].

**--- end of change 1 ---**

**--- start of change 2 ---**

#### 8.17.2.2.a SFTD Measurement requirements with CCA on target frequency

When no DRX is used in either of PCell and PSCell, the physical layer measurement period of the SFTD measurement shall be Tmeasure\_SFTD1 = max(200 ms, (5 + L) x SMTC period), where L is the number of SSBs (or DRSs) blocked by unsuccessful CCA. Lmax is the maximum value of L (i.e., L≤Lmax) and is defined in Table 8.17.2.2.a-2.

When DRX is used in either of the E-UTRA PCell or the NR PSCell, or in both PCell and PSCell, the physical layer measurement period (Tmeasure\_SFTD1) of the SFTD measurement shall be as specified in table 8.17.2.2.a-1.

In the requirements of clause 8.17.2.2.a, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the first two successive candidate SSB positions for the same SS/PBCH block index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding period; otherwise the SMTC occasion is considered as available at the UE.

Table 8.17.2.2.a-1: SFTD measurement requirement when DRX is used

|  |  |
| --- | --- |
| DRX cycle length (s) Note 3 | Tmeasure\_SFTD1 (s) |
| ≤0.04 | max(0.2,(5 + L) x SMTC period) (Note1) |
| 0.04<DRX cycle≤0.32 | (8 + L) x max(DRX cycle, SMTC period) |
| 0.32<DRX cycle≤10.24 | (5 + L) x DRX cycle |
| Note 1: Number of DRX cycles depends upon the DRX cycle in use.  Note 2: DRX cycle length in this table refers to the DRX cycle length configured for PCell or PSCell. When DRX is used in both PCell and PSCell, DRX cycle length in this table refers to the longer of the DRX cycle lengths for PCell and PSCell.  Note 3: L is the total number of SMTC occasions not available at the UE. The maximum value of L, Lmax, is defined in Table 8.17.2.2.a-2. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. | |

**Table 8.17.2.2.a-2: Maximum number of missed DRS occasions**

|  |  |
| --- | --- |
| **Condition** | **Lmax** |
| max(DRX cycle, SMTC period) ≤ 40 ms | 7 |
| 40 ms < max(DRX cycle, SMTC period) ≤ 320 ms | 5 |
| DRX cycle > 320 ms | 3 |
| Note 1: DRX cycle length in this table refers to the DRX cycle length configured for PCell or PSCell. When DRX is used in both PCell and PSCell, DRX cycle length in this table refers to the longer of the DRX cycle lengths for PCell and PSCell. When no DRX is used in both PCell and PSCell, DRX cycle = 0.  Note 2: The SMTC period is the one used by PSCell. | |

If PSCell is changed without changing carrier frequency of PSCell, while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed Tmeasure\_SFTD2 as defined by the following expression:

Tmeasure\_SFTD2 = (M+1)\*(Tmeasure\_SFTD1) + M\*TPSCell\_change\_ENDC

where:

M is the number of times the NR PSCell is changed over the measurement period (Tmeasure\_SFTD2), and

TPSCell\_change\_ENDC is the time necessary to change the PSCell; it can be up to 25 ms.

If PCell is changed, or if PSCell is changed with different carrier frequency from PSCell, the UE shall terminate SFTD measurements.

When Lexceeds Lmax, the UE shall terminate the SFTD measurement.

The time difference between frame timing acquisition for PCell and PSCell, t1 and t2 respectively, shall fulfill |t1-t2| < max(200 ms, 5\*TSMTC), where TSMTC is the SMTC period of PSCell. Otherwise the UE shall invalidate the SFTD measurement.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.27.

**--- end of change 2 ---**

**--- start of change 3 ---**

### 8.17.4A E-UTRA Inter-RAT NR Measurements when CCA is used when Configured with E-UTRA-NR Dual Connectivity Operation

#### 8.17.4A.1 E-UTRAN FDD – NR measurements when configured with E-UTRA-NR Dual connectivity

Requirements in this clause apply for the NR capable UE configured with inter-RAT measurement on NR, when NR is in carrier frequencies with CCA. For UE supporting EN-DC operation, the requirements in this clause shall apply when NR PSCell is configured. When the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD-NR measurement requirements defined in section 8.1.2.4.21A shall apply.

In the requirements of clause 8.17.4A, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but *N* candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding period, where:

* For the cell detection procedure: *N* is at least one candidate SSB position (NOTE: the one candidate SSB position for the cell detection shall not be impacted by the set of candidate SSB positions which are already being measured by the UE within the current measurement period of the on-going measurements), and
* For other procedures in clause 8.17.4A: *N* are the first two successive candidate SSB positions when two or more candidate SSB positions are configured for this SSB index in one discovery burst transmission window, otherwise N is one candidate SSB position;

otherwise the SMTC occasion is considered as available at the UE.

The UE shall be able to identify new inter-RAT NR cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-RAT NR cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided.

An NR cell is considered detectable when:

- NR SS-RSRP related conditions in the accuracy requirements in clause TBD are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex TBD of TS 38.133 [50],

- NR SS-RSRQ related conditions in the accuracy requirements in clause TBD are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex TBD of TS 38.133 [50],

- NR SS-SINR related conditions in the accuracy requirements in clause TBD are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex TBD of TS 38.133 [50].

The NR SS-RSRP measurement accuracy for all measured NR cells shall be as specified in clause TBD, the NR SS-RSRQ measurement accuracy for all measured cells shall be as specified in clause TBD, and NR SS-SINR measurement accuracy for all measured cells shall be as specified in clause TBD.

##### 8.17.4A.1.1 NR Inter-RAT cell identification

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

Tidentify\_NR\_cca\_without\_index = (TPSS/SSS\_sync\_NR\_cca + TSSB\_measurement\_period\_NR\_cca) ms

Tidentify\_NR\_cca\_with\_index = (TPSS/SSS\_sync\_NR\_cca + TSSB\_measurement\_period\_NR\_cca + TSSB\_time\_index\_NR\_cca) ms

Where:

TPSS/SSS\_sync\_NR\_cca: it is the time period used in PSS/SSS detection given in table 8.17.4A.1.1 -1

TSSB\_time\_index\_NR\_cca: it is the time period used to acquire the index of the SSB being measured given in table 8.17.4A.1.1-2

TSSB\_measurement\_period\_NR\_cca: equal to a measurement period of SSB based measurement given in table 8.17.4A.1.2-1

CSSFNR,EN-DC: it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i defined in clause 9.1.5.2.1 of TS 38.133 [50] for measurement conducted within measurement gaps in EN-DC mode.

Table 8.17.4A.1.1-1: Time period for PSS/SSS detection

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | TPSS/SSS\_sync\_NR\_cca |
| No DRX | Max(600ms, (8 +LPSS/SSS,gaps) × Max(MGRP, SMTC period)) × CSSFNR,EN-DC |
| DRX cycle ≤ 320ms | Max(600ms, ceil((8+LPSS/SSS,gaps) × 1.5) × Max(MGRP, SMTC period, DRX cycle)) × CSSFNR,EN-DC |
| DRX cycle > 320ms | (8 +LPSS/SSS,gaps) × DRX cycle × CSSFNR,EN-DC |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50]  are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: LPSS/SSS,gaps is the number of SMTC occasion not available at the UE during TPSS/SSS\_sync\_NR\_cca, where LPSS/SSS,gaps ≤ LPSS/SSS,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 4:   LPSS/SSS,gaps = 12 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms LPSS/SSS,gaps = 8 for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and LPSS/SSS,gaps = 5 for DRX cycle > 320 ms. | |

Upon exceeding LPSS/SSS,gaps,max, the UE is not required to meet the corresponding PSS/SSS detection requirement. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

Table 8.17.4A.1.1-2: Time period for time index detection

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | TSSB\_time\_index\_NR\_cca |
| No DRX | Max(120ms, (3 + Lind,gaps)  × max(MGRP, SMTC period)) × CSSFNR,EN-DC |
| DRX cycle ≤ 320ms | Max(120ms, ceil((3 + Lind,gaps)  × 1.5) × max(MGRP, SMTC period, DRX cycle)) × CSSFNR,EN-DC |
| DRX cycle > 320ms | (3 + Lind,gaps) × DRX cycle × CSSFNR,EN-DC |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: Lind,gaps is the number of SMTC occasions not available at the UE during TSSB\_time\_index\_NR\_cca, where Lind,gaps ≤ Lind,gaps,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 4: Lind,gaps,max = 5 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lind,gaps,max = 3 for max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lind,gaps,max = 2 for DRX cycle > 320 ms. | |

The UE shall restart the time index detection upon exceeding Lind,gaps,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

When the time period of unsuccessful measurement attemps due to exceeding the maximum number of unavailable at the UE SMTC occasions of an already identified cell exceeds the maximum time requirement for the cell to remain known defined in clause 9.3A.6.3, the UE shall stop the measurement attempts on this SSB and perform the detection procedure again, like for any other SSB.

When SCG DRX is in use the applicable DRX cycle is the SCG DRX cycle.

##### 8.17.4A.1.2 NR Inter-RAT measurement

When measurement gaps are provided for inter-RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses TBD, TBD, and TBD, respectively, with a measurement period given by:

Table 8.17.4A.1.2-1: Measurement period for NR inter-RAT measurements with gaps

|  |  |
| --- | --- |
| Condition NOTE1,2,3,4 | T SSB\_measurement\_period\_NR\_cca |
| No DRX | Max(200ms, (8+ Lmeas) × max(MGRP, SMTC period)) × CSSFNR,EN-DC |
| DRX cycle ≤ 320ms | Max(200ms, ceil((8+ Lmeas) x 1.5) × max(MGRP, SMTC period, DRX cycle)) × CSSFNR,EN-DC |
| DRX cycle > 320ms | (8+ Lmeas) × DRX cycle × CSSFNR,EN-DC |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.  NOTE 3: Lmeas is the number of SMTC occasion not available at the UE during T SSB\_measurement\_period\_NR\_cca, where Lmeas ≤ Lmeas,max. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.  NOTE 4:   Lmeas,max = 12 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, Lmeas,max = 8 for max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and Lmeas,max = 5 for DRX cycle > 320 ms. | |

The UE shall restart the measurement upon exceeding Lmeas,max. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

When the time period of unsuccessful measurement attemps due to exceeding the maximum number of unavailable at the UE SMTC occasions of an already identified cell exceeds the maximum time requirement for the cell to remain known defined in clause 9.3A.6.3, the UE shall stop the measurement attempts on this SSB and perform the detection procedure again, like for any other SSB.

When SCG DRX is in use the applicable DRX cycle is the SCG DRX cycle.

##### 8.17.4A.1.3 NR Inter-RAT measurement reporting

8.17.4.1.3.1 Periodic Reporting

Reported NR SS-RSRP, NR SS-RSRQ, and NR SS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses TBD, TBD and TBD, respectively.

8.17.4A.1.3.2 Event-triggered Periodic Reporting

Reported NR SS-RSRP, NR SS-RSRQ, and NR SS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in clauses TBD, TBD and TBD, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.4A.1.3.3.

8.17.4A.1.3.3 Event-triggered Reporting

Reported NR SS-RSRP, NR SS-RSRQ, and NR SS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses TBD, TBD and TBD, respectively.

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 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 for UE to send the measurement report and all delays due to UL CCA failures until the successful transmission of the report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within Tidentify\_NR\_cca\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index. Otherwise UE shall be able to identify a new detectable NR cell within Tidentify\_NR\_cca\_with\_index. Both Tidentify\_NR\_cca\_without\_index and Tidentify\_NR\_cca\_with\_index are defined in clause 8.17.4A.1.1.When L3 filtering is used an additional delay can be expected.

If an NR cell which has been detectable at least for the time period Tidentify\_NR\_cca\_without\_index or Tidentify\_NR\_cca\_with\_index defined in clause 8.17.4A.1.1 and then triggers the measurement report as per TS 38.331 [38], the event triggered measurement reporting delay shall be less than TSSB\_measurement\_period\_NR\_cca defined in clause 8.17.4A.1.2 provided the timing to that cell has not changed more than ± 3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used an additional delay can be expected.

##### 8.17.4A.1.4 NR inter-RAT RSSI measurements

The UE physical layer shall be capable of performing the RSSI measurements, defined in TS 38.215 [58], on one or more inter-RAT carriers operating with CCA, TS 37.213 [57], if the carrier(s) are indicated by higher layers [38], and reporting the RSSI measurements to higher layers. The UE physical layer shall provide to higher layers a single RSSI sample for each OFDM symbol within each configured RSSI measurement duration [38] occurring with a configured RSSI measurement timing configuration periodicity, *rmtc-Periodicity,* according to [38].

**Table 8.17.4A.1.4-1: Measurement period for inter-RAT RSSI measurements with gaps**

|  |  |
| --- | --- |
| **Condition NOTE1,2,3,4** | **T RSSI\_measurement\_period\_NR\_cca** |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFNR,EN-DC) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x CSSFNR,EN-DC) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]. | |

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

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

The RSSI measurement performed and reported according to this section shall meet the RSSI measurement accuracy requirement in Section TBD.

##### 8.17.4A.1.5 NR inter-RAT channel occupancy measurements

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

**8.17.4A.1.5-1: Measurement period for inter-RAT Channel Occupancy measurements with gaps**

|  |  |
| --- | --- |
| **Condition NOTE1,2,3,4** | **T CO\_measurement\_period\_NR\_cca** |
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x CSSFNR,EN-DC) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x CSSFNR,EN-DC) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]. | |

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

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

The channel occupancy measurement performed and reported according to this section shall meet the channel occupancy measurement accuracy requirements in Section TBD of TS 38.133 [50].

#### 8.17.4A.2 E-UTRAN TDD – NR measurements when configured with E-UTRA-NR Dual connectivity

The requirements in clause 8.17.4A.1 also apply for this section.

**--- end of change 3 ---**