**3GPP TSG-RAN WG4 Meeting #112 R4-2413937**

**Maastricht, Netherlands, 19th – 23rd August, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | **4640** | **rev** | **1** | **Current version:** | **16.20.0** |  |
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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:***  | (LTE\_NR\_DC\_CA\_enh-Core) CR on IDLE mode CA/DC measurements |
|  |  |
| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | LTE\_NR\_DC\_CA\_enh-Core |  | ***Date:*** | 2024-08-08 |
|  |  |  |  |  |
| ***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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | 1. For measurements of inter-frequency CA/DC candidate cells, the expressions are not aligned in the table and text.
2. For measurements of E-UTRAN inter-RAT DC candidate cells, based on the following agreements in R4-2012301, the accuracy requirements for inter-RAT measurement in 4.4.2.4 should follow the LTE inter-frequency requirements for CA Idle mode measurements for overlapping carrier which is clause 9.1.3B.2 in TS 36.133.
	* For overlapping EMR carriers, the UE measurement accuracy requirements for carriers configured for EMR:
		+ RAN4 to define relaxed NR measurement requirements for overlapping carrier compared to existing NR inter-frequency requirements in terms of SNR and accuracy.
		+ LTE inter-RAT measurement requirements for overlapping carrier follows existing LTE inter-frequency requirements for CA Idle mode measurements for overlapping carrier.
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| ***Summary of change:*** | 1. Update the expressions in inter-frequency CA/DC candidate cell measurement.
2. Correct the accuracy requirements in E-UTRAN inter-RAT DC candidate cell measurement.
3. Other corrections.
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| ***Consequences if not approved:*** | The inter-frequency CA/DC and inter-RAT DC candidate cell measurement requirements are incorrect. |
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| ***Clauses affected:*** | 4.4.2.2, 4.4.2.4 |
|  |  |
|  | **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:*** | Revision of R4-2411363 |

# <Start of Change 1>

#### 4.4.2.2 Measurements of inter-frequency CA/DC candidate cells

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

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

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

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

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

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

For UE supporting *idleInactiveNR-MeasBeamReport-r16*, if the UE is configured with *beamMeasConfigIdle-r16* on one or more carrier for idle mode CA/DC measurement, the UE, on each carrier, shall be able to:

- detect a newly detectable inter-frequency NR cell and perform RSRP/RSRQ measurement in preparation for reporting, and

- acquire the SSB index for a newly detectable inter-frequency NR cell if *beamMeasConfigIdle-r16* is configured on this carrier and perform RSRP/RSRQ measurement in preparation for reporting,

within the requirements defined in clause 4.2.2.4 plus k\* TSSB\_index,NR\_Inter, where k is the number of carriers configured for idle mode CA measurement with *beamMeasConfigIdle-r16*, and TSSB\_index,NR\_Inter is the additional time period used to acquire the index of the SSB being measured as defined in table 4.4.2.2-1.

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

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

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

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

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

# <End of Change 1>

# <Start of Change 2>

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

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

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

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

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

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

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

For overlapping inter-RAT carriers configured for idle mode CA/DC measurements, the UE shall be capable of performing RSRP and RSRQ measurements of the carriers, and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements of the carriers configured for idle mode CA/DC measurements to higher layers, with measurement accuracy as specified in clauses 9.1.3B.2 and 9.1.6B.2 [15], respectively.

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

# <End of Change 2>