**3GPP TSG- RAN4 Meeting #** **104-e *R4-2212996***

**Electronic Meeting, August 15 – August 26, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **2505** | **rev** | **1** | **Current version:** | **17.6.0** |  |
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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 |  | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | Correction on measurement with eDRX for RedCap UE |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_redcap-Core |  | ***Date:*** | 2022-8-22 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories 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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | 1. For inter-RAT E-UTRAN measurement, the eDRX idle cycle is configure by NR side. NR eDRX configuration also includes 2.56s. Therefore the 2.56s eDRX shall be added when defining requirements for inter-RAT LTE when eDRX idle is configured.
2. As UE performs measurements both within PTW and outside PTW in inactive mode when idle\_eDRX is configured, if the UE has not found any new suitable cell based on searches and measurements during the time T’, the UE shall initiate cell selection procedures

- T’= 10 s, if the UE is not configured with eDRX\_inactive cycle- T’= MAX (10 s, one eDRX\_inactive cycle) if the UE is configured with eDRX\_inactive cycle for FR1, or- T’= MAX (10 s, N1\* eDRX\_inactive cycle) if the UE is configured with eDRX\_inactive cycle for FR2. |
|  |  |
| ***Summary of change:*** | 1. Adding 2.56s eDRX to the measurement requirements for inter-RAT LTE when eDRX idle is configured.
2. Correct the time duration for inactive UE where the UE has not found any new suitable cell based on searches and measurements, the UE shall shall initiate cell selection procedures.
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|  |  |
| ***Consequences if not approved:*** | Incorrect implementation for RedCap UE. |
|  |  |
| ***Clauses affected:*** | 4.2B.2.5; 4.2B.2.11; 5.1B.2.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **x** |  |  Test specifications | TS38.533 |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

<Start of Change 1>

#### 4.2B.2.5 Measurements of inter-RAT E-UTRAN cells for RedCap UE

If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ then the UE shall search for inter-RAT E-UTRAN layers of higher priority at least every Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2B.2.7.

If Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ then the UE shall search for and measure inter-RAT E-UTRAN layers of higher, lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority inter-RAT E-UTRAN layers shall be the same as that defined below for lower priority RATs.

The requirements in this clause apply for inter-RAT E-UTRAN FDD measurements and E-UTRA TDD measurements. When the measurement rules indicate that inter-RAT E-UTRAN cells are to be measured, the UE shall measure RSRP and RSRQ of detected E-UTRA cells in the neighbour frequency list at the minimum measurement rate specified in this clause.

The parameter NEUTRA\_carrier\_RedCap is the total number of configured E-UTRA carriers in the neighbour frequency list. The UE shall filter RSRP and RSRQ measurements of each measured E-UTRA cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least Tmeasure,EUTRAN\_RedCap/2.

An inter-RAT E-UTRA cell is considered to be detectable provided the following conditions are fulfilled:

- the same conditions as for inter-frequency RSRP measurements specified in TS 36.133 [15, Annex B.x.y] are fulfilled for a corresponding Band, and

- the same conditions as for inter-frequency RSRQ measurements specified in TS 36.133 [15, Annex B.x.y] are fulfilled for a corresponding Band.

- SCH conditions specified in TS 36.133 [15, Annex B.x.y] are fulfilled for a corresponding Band

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 (NEUTRA\_carrier\_RedCap) \* Tdetect,EUTRAN\_RedCap when Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ when Treselection = 0 provided that the reselection criteria are met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities for 2 Rx RedCap and at least [6dB] for RSRP reselections based on absolute priorities or [4dB] for RSRQ reselections based on absolute priorities for 1 Rx RedCap.

Cells which have been detected shall be measured at least every (NEUTRA\_carrier\_RedCap) \* Tmeasure,EUTRAN\_RedCap when Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ.

When higher priority cells are found by the higher priority search, they shall be measured at least every Tmeasure,EUTRAN\_RedCap. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell.

If the UE detects on an inter-RAT E-UTRAN carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall not consider an inter-RAT E-UTRA cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-RAT E-UTRA cell has met reselection criterion defined in TS 38.304 [1] within (NEUTRA\_carrier\_RedCap) \* Tevaluate,EUTRAN\_RedCap when Treselection = 0provided that the reselection criteria are met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities for 2 Rx RedCap and at least [6dB] for RSRP reselections based on absolute priorities or [4dB] for RSRQ reselections based on absolute priorities for 1 Rx RedCap.

If Treselection timer has a non-zero value and the inter-RAT E-UTRA cell is satisfied with the reselection criteria which are defined in TS 38.304 [1], the UE shall evaluate this E-UTRA cell for the Treselection time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

For 1 Rx RedCap and 2 Rx RedCap not configured with eDRX\_IDLE cycle, Tdetect,EUTRAN\_RedCap, Tmeasure,EUTRAN\_RedCap and Tevaluate, E-UTRAN\_RedCap are specified in Table 4.2B.2.5-1 and Table 4.2.2.5-1 respectively.

For 1 Rx RedCap and 2 Rx RedCap configured with eDRX\_IDLE cycle, Tdetect,EUTRAN\_RedCap, Tmeasure,EUTRAN\_RedCap and Tevaluate, E-UTRAN\_RedCap are specified in Table 4.2B.2.5-2, where the requirements apply provided that the serving cell is configured with eDRX\_IDLE and is the same in all PTWs during any of Tdetect,EUTRAN\_RedCap, Tmeasure,EUTRAN\_RedCap and Tevaluate, E-UTRAN\_RedCap when multiple PTWs are used.

Table 4.2B.2.5-1: Tdetect,EUTRAN\_RedCap, Tmeasure,EUTRAN\_RedCap, and Tevaluate,EUTRAN\_RedCap for 1 Rx RedCap

|  |  |  |  |
| --- | --- | --- | --- |
| 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 (36) | 1.28 (4) | 5.12 (16) |
| 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) |
| 1.28 | 32(25) | 1.28 (1) | 6.4 (5) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |

Table 4.2B.2.5-2: Tdetect,EUTRAN\_RedCap, Tmeasure,EUTRAN\_RedCap, and Tevaluate,EUTRAN\_RedCap for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | Tdetect,EUTRAN\_RedCap [s] (number of DRX or eDRX cycles Note 3) | Tmeasure,EUTRAN\_RedCap [s] (number of DRX or eDRX cycles Note 3) | Tevaluate,E-UTRAN\_RedCap[s] (number of DRX or eDRX cycles Note 3) |
| 2.56 | N/A | N/A | 58.88 (23) | 2.56 (1) | 7.68 (3) |
| 5.12 | N/A | N/A | 117.76 (23) | 5.12 (1) | 10.24 (2) |
| 10.24 ≤ eDRX\_IDLE cycle length ≤ 2621.444 | 0.32 | ≥1.28 (1) |  (23) | 0.32 (1) | 0.64 (2) |
| 0.64 | ≥1.28 (1) | 0.64 (1) | 1.28 (2) |
| 1.28 | ≥2.56 (2) | 1.28 (1) | 2.56 (2) |
| 2.56 | ≥5.12 (4) | 2.56 (1) | 5.12 (2) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.NOTE 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].NOTE 3: Number of eDRX cycles when eDRX\_IDLE cycle length equals 5.12s, number of DRX cycles otherwise.NOTE 4: The lower bound of PTW length is derived based on $\left⌈\frac{Tevaluate,E-UTRAN\\_RedCap\*DRX\\_cycle}{1.28}\right⌉\*1.28$. |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX\_IDLE, being configured with eDRX\_IDLE cycle, changing eDRX\_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE shall meet the requirement corresponding to the second state.

<End of Change 1>

<Start of Change 2>

#### 4.2B.2.11 Measurements of inter-RAT E-UTRAN cells for UE configured with relaxed measurement criterion

##### 4.2B.2.11.1 Introduction

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

- Relaxed measurement criterion for a stationary UE defined in clause 5.2.4.9.X in [1],

- Relaxed measurement criterion for a stationary UE not at cell edge defined in clause 5.2.4.9.Y in [1],

- Both low mobility criterion and stationary criterion as defined in clause 5.2.4.9.1 and 5.2.4.9.X in [1] respectively.

##### 4.2B.2.11.2 Measurements for UE fulfilling stationary criterion

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

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

- UE is configured with both *stationaryMobilityEvaluation* [2] criterion and *cellEdgeEvaluationWhileStationary* [2] criterion and *combineRelaxedMeasCondition2* [2] not configured, and UE has fulfilled only the *stationaryMobilityEvaluation* [2] criterion, and

The requirements defined in clause 4.2B.2.5 apply for this clause except that:

- Tdetect,EUTRAN\_Relax as specified in Table 4.2B.2.11.2-1 and Table 4.2B.2.11.2-2 for 1 Rx RedCap and 2 Rx RedCap respectively.

- Tmeasure,EUTRAN\_Relax as specified in Table 4.2B.2.11.2-1 and Table 4.2B.2.11.2-2 for 1 Rx RedCap and 2 Rx RedCap respectively.

- Tevaluate,EUTRAN\_Relax as specified in Table 4.2B.2.11.2-1 and Table 4.2B.2.11.2-2 for 1 Rx RedCap and 2 Rx RedCap respectively.

If the UE is configured with eDRX\_IDLE cycle then the requirements in Table 4.2B.2.11.2-3 are applicable for eDRX cycle < 10.24 s.

If the UE is configured with eDRX\_IDLE cycle ≥ 10.24 s, then the requirements in Table 4.2B.2.11.2-4 apply provided that filtering of a measurement is done within a single PTW and provided that the eDRX cycle is ≤ [163.84] sec and evaluation/measurement time with relaxation on one carrier is not greater than single PTW window length.

Table 4.2B.2.11.2-1: Tdetect,EUTRAN\_RedCap\_Relax, Tmeasure,EUTRAN\_RedCap\_Relax, and Tevaluate,EUTRAN\_RedCap\_Relax for 1 Rx RedCap

|  |  |  |  |
| --- | --- | --- | --- |
| 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 K5 (36 x K5) | 1.28 x K5 (4 x K5) | 5.12 x K5 (16 x K5) |
| 0.64 | 17.92 x K5 (28 x K5) | 1.28 x K5 (2 x K5) | 5.12 x K5 (8 x K5) |
| 1.28 | 32 x K5 (25 x K5) | 1.28 x K5 (1 x K5) | 6.4 x K5 (5 x K5) |
| 2.56 | 58.88 x K5 (23 x K5) | 2.56 x K5 (1 x K5) | 7.68 x K5 (3 x K5) |
| Note 1: K5 = 6 is the measurement relaxation factor applicable for UE fulfilling the *stationaryMobilityEvaluation* [2] criterion. |

Table 4.2B.2.11.2-2: Tdetect,EUTRAN\_Relax, Tmeasure,EUTRAN\_Relax, and Tevaluate,EUTRAN\_Relax for 2 Rx RedCap

|  |  |  |  |
| --- | --- | --- | --- |
| 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 K5 (36 x K5) | 1.28 x K5 (4 x K5) | 5.12 x K5 (16 x K5) |
| 0.64 | 17.92 x K5 (28 x K5) | 1.28 x K5 (2 x K5) | 5.12 x K5 (8 x K5) |
| 1.28 | 32 x K5 (25 x K5) | 1.28 x K5 (1 x K5) | 6.4 x K5 (5 x K5) |
| 2.56 | 58.88 x K5 (23 x K5) | 2.56 x K5 (1 x K5) | 7.68 x K5 (3 x K5) |

Table 4.2B.2.10.2-3: Tdetect,E-UTRAN \_RedCap\_Relax, Tmeasure,NR\_,E-UTRAN \_RedCap\_Relax and Tevaluate,NR\_,E-UTRAN \_RedCap\_Relax for UE configured with eDRX\_IDLE cycle

|  |  |  |  |
| --- | --- | --- | --- |
| **eDRX\_IDLE cycle length [s]** | **Tdetect,NR\_E-UTRAN\_RedCap\_Relax [s] (number of DRX cycles)** | **Tmeasure,NR\_E-UTRAN\_RedCap\_Relax [s] (number of DRX cycles)** | **Tevaluate,NR\_E-UTRAN\_RedCap\_Relax [s] (number of DRX cycles)** |
|
| 2.56 | 58.88 x K3 (23 x K3) | 2.56 x K3 (1 x K3) | 5.12 x K3 (2 x K3) |
| 5.12 | 117.76 x K3 (23 x K3) | 5.12 x K3 (1 x K3) | 10.24 x K3 (2 x K3) |
| Note 1: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1. If different SMTC periodicities are configured for different cells, the SMTC periodicity in this note is the one used by the cell being identified. During PSS/SSS detection, the periodicity of the SMTC configured for the intra-frequency carrier is assumed, and if the actual SSB transmission periodicity is greater than the SMTC configured for the intra-frequency carrier, longer Tdetect, NR\_intra is expected.Note 2: K3 = 6 is the measurement relaxation factor applicable for UE fulfilling the *stationaryMobilityEvaluation* [2] criterion. |

Table 4.2B.2.10.2-4: Tdetect,E-UTRAN \_RedCap\_Relax, Tmeasure,NR\_,E-UTRAN \_RedCap\_Relax and Tevaluate,NR\_,E-UTRAN \_RedCap\_Relax for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | Tdetect,EUTRAN\_RedCap\_Relax [s] (number of DRX or eDRX cycles Note 3) | Tmeasure,EUTRAN\_RedCap\_Relax [s] (number of DRX or eDRX cycles Note 3) | Tevaluate,E-UTRAN\_RedCap\_Relax[s] (number of DRX or eDRX cycles Note 3) |
| 10.24 ≤ eDRX\_IDLE cycle length ≤ 2621.444 | 0.32 | ≥1.28 (1) | K3 x  (23 x K3) | 0.32 x K3 (1 x K3) | 0.64 x K3 (2 x K3) |
| 0.64 | ≥1.28 (1) | 0.64 x K3 (1 x K3) | 1.28 x K3 (2 x K3) |
| 1.28 | ≥2.56 (2) | 1.28 x K3 (1 x K3) | 2.56 x K3 (2 x K3) |
| 2.56 | ≥5.12 (4) | 2.56 x K3 (1 x K3) | 5.12 x K3 (2 x K3) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.NOTE 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].NOTE 3: Number of eDRX cycles when eDRX\_IDLE cycle length equals 5.12s, number of DRX cycles otherwise.NOTE 4: The lower bound of PTW length is derived based on $\left⌈\frac{Tevaluate,E-UTRAN\\_RedCap\*DRX\\_cycle}{1.28}\right⌉\*1.28$. |

<End of Change 2>

<Start of Change 3>

#### 5.1B.2.2 Measurement and evaluation of serving cell

The requirements in clause 4.2B.2.2 shall apply when UE is not configured with eDRX\_IDLE. When UE is configured with eDRX\_IDLE, the requirements defined in section 4.2B.2.2 shall apply with Nserv\_RedCap defined in Table 5.1B.2.2-1 and Table 5.1B.2.2-2.

Table 5.1B.2.2-1: Nserv\_RedCapfor inactive Redcap UE configured with eDRX\_IDLE cycle, (Frequency range FR1)

|  |  |  |  |
| --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX or eDRX INACTIVE cycle length[s] | T [s] | Nserv \_RedCap [number of T ] |
| 2.56 ≤eDRX\_IDLE cycle length ≤10485.76 | 0.32 ≤DRX\_Inactive cycle length ≤2.56; or2.56 ≤eDRX\_Inactive cycle length ≤10.24 if inactive eDRX is configured  | 0.32 | 4\*M1 |
| 0.64 | 4\*M1 |
| 1.28 | 2 |
| 2.56 | 2 |
| 5.12 | 2 |
| 10.24  | 2 |
| Note1: T is dertermined according to clause 7.1 in [1].Note2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle ≤ 0.64 second. |

Table 5.1B.2.2-2: Nserv\_RedCapfor inactive Redcap UE configured with eDRX\_IDLE cycle, (Frequency range FR2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX or eDRX INACTIVE cycle length[s] | T [s] | Scaling Factor (N1) | Nserv\_RedCap [number of T] |
| 2.56 ≤eDRX\_IDLE cycle length ≤10485.76 | 0.32 ≤DRX\_Inactive cycle length ≤2.56; or2.56 ≤eDRX\_Inactive cycle length ≤10.24 if inactive eDRX is configured | 0.32 | 8 | 4\* N1 |
| 0.64 | 5 | 4\* N1 |
| 1.28 | 4 | 2\* N1 |
| 2.56 | 3 | 2\* N1 |
| 5.12 | 3 | 2\* N1 |
| 10.24  | 3 | 2\* N1 |
| Note1: T is dertermined according to clause 7.1 in [1]. |

If the UE in RRC\_INACTIVE has not found any new suitable cell based on searches and measurements using the intra-frequency, inter-frequency and inter-RAT information indicated in the system information during the time T’, the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 38.304 [1], where

- T’= 10 s, if the UE is not configured with eDRX\_inactive cycle, or

- T’= MAX (10 s, one eDRX\_inactive cycle) if the UE is configured with eDRX\_inactive cycle for FR1, or

- T’= MAX (10 s, N1\* eDRX\_inactive cycle) if the UE is configured with eDRX\_inactive cycle for FR2.

<End of Change 3>