**3GPP TSG- RAN4 Meeting #** **104-e *R4-2212998***

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

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **2506** | **rev** | **1** | **Current version:** | **17.6.0** |  |
|  |
| *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:***  | CR on higher priority inter-frequency measurement relaxation for RedCap |
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| ***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)* |
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| ***Reason for change:*** | There are no requirements on higher priority inter-frequency measurement relaxation when only Rel-17 stationarity criterion is satisfied and Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ or both Rel-17 criteria are satisfied. |
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| ***Summary of change:*** | The folllowing requriements for high priority inter-frquency measurement relaxation are specified:* When only Rel-17 stationarity criterion is satisfied and Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, UE performs measurement on high priority layer per 4 hour \*Nlayer.
* When both R17 criteria are satisfied,
* When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, UE performs the measurement relaxation for lower, equal and higher priority frequency layers are the same, i.e., 4 hours.
* When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, UE performs measurement on high priority layer per 4 hour \*Nlayer.
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| ***Consequences if not approved:*** | Imcomplete requirements for RedCap UE. |
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| ***Clauses affected:*** | 4.2B.2.10.2; 4.2B.2.10.3 |
|  |  |
|  | **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.2.10.2 Measurements for UE fulfilling stationary criterion

This clause contains requirements for measurements on inter-frequency NR 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.2.4 apply for this clause except that:

- Tdetect,NR\_Inter\_RedCap\_Relaxas specified in Table 4.2B.2.10.2-1 and Table 4.2B.2.10.2-1 for 1 Rx RedCap and 2 Rx RedCap respectively.

- Tmeasure,NR\_Inter\_RedCap\_Relax as specified in Table 4.2B.2.10.2-1 and Table 4.2B.2.10.2-1 for 1 Rx RedCap and 2 Rx RedCap respectively.

- Tevaluate,NR\_Inter\_RedCap\_Relax as specified in Table 4.2B.2.10.2-1 and Table 4.2B.2.10.2-1 for 1 Rx RedCap and 2 Rx RedCap respectively.

- When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ then the UE shall search for inter-frequency layers of higher priority at least every K2\*Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7 and, K2 = 240.

If the UE is configured with eDRX\_IDLE cycle then the requirements in Table 4.2B.2.10.2-3 and Table 4.2B.2.10.2-4 are applicable for eDRX cycle up to 10.24 s in FR1 and FR2 respectively.

If the UE is configured with eDRX\_IDLE cycle greater than 10.24 s in FR1 and FR2, then the requirements in Table Table 4.2B.2.10.2-5 and Table 4.2B.2.10.2-6 respectively apply provided that 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.2.10.2-1: Tdetect,NR\_Inter\_RedCap\_Relax, Tmeasure,NR\_Inter\_RedCap\_Relax and Tevaluate,NR\_Inter\_RedCap\_Relax for 1 Rx RedCap UE

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Tdetect,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles) | Tmeasure,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles) | Tevaluate,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles) |
| 0.32 | 11.52 x 1.5 x K4(36 x 1.5 x K4) | 1.28 x 1.5 x K4 (4 x 1.5 x K4) | 5.12 x 1.5 x K4 (16 x 1.5 x K4) |
| 0.64 | 17.92 x K4 (28 x K4) | 1.28x K4 (2 x K4) | 5.12 x K4 (8 x K4) |
| 1.28 | 32 x K4 (25 x K4) | 1.28x K4 (1 x K4) | 6.4 x K4 (5 x K4) |
| 2.56 | 58.88 x K4 (23 x K4) | 2.56 x K4 (1 x K4) | 7.68 x K4 (3 x K4) |
| Note 1: K4 = 6 is the measurement relaxation factor applicable for UE fulfilling the *stationaryMobilityEvaluation* [2] criterion. |

Table 4.2B.2.10.2-2: Tdetect,NR\_Inter\_RedCap\_Relax, Tmeasure,NR\_Inter\_RedCap\_Relax and Tevaluate,NR\_Inter\_RedCap\_Relax for 2 Rx RedCap UE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | Tdetect,NR\_Inter\_Relax [s] (number of DRX cycles) | Tmeasure,NR\_Inter\_Relax [s] (number of DRX cycles) | Tevaluate,NR\_Inter\_Relax [s] (number of DRX cycles) |
| FR1 | FR2Note1 |
| 0.32 | 1 | 8 | 11.52 x N1 x 1.5 x K4 (36 x N1 x 1.5 x K4) | 1.28 x N1 x 1.5 x K4 (4 x N1 x 1.5 x K4) | 5.12 x N1 x 1.5 x K4 (16 x N1 x 1.5 x K4) |
| 0.64 |  | 5 | 17.92x N1 x K4 (28 x N1 x K4) | 1.28 x N1 x K4 (2 x N1 x K4) | 5.12 x N1 x K4 (8 x N1 x K4) |
| 1.28 |  | 4 | 32 x N1 x K4 (25 x N1 x K4) | 1.28 x N1 x K4 (1 x N1 x K4) | 6.4 x N1 x K4 (5 x N1 x K4) |
| 2.56 |  | 3 | 58.88 x N1 x K4 (23 x N1 x K4) | 2.56 x N1 x K4 (1 x N1 x K4) | 7.68 x N1 x K4 (3 x N1 x K4) |
| Note 1: Applies for RedCap UE of all supporting power class.Note 2: K4 = 6 is the measurement relaxation factor applicable for UE fulfilling the *stationaryMobilityEvaluation* [2] criterion. |

Table 4.2B.2.10.2-3: Tdetect,NR\_Inter\_RedCap\_Relax, Tmeasure,NR\_Inter\_RedCap\_Relax and Tevaluate,NR\_Inter\_RedCap\_Relax for UE configured with eDRX\_IDLE cycle (Frequency range FR1) for eDRX\_IDLE cycle upto 10.24 s

|  |  |  |  |
| --- | --- | --- | --- |
| **eDRX\_IDLE cycle length [s]** | **Tdetect,NR\_Inter\_RedCap\_Relaxx [s] (number of DRX cycles)** | **Tmeasure,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles)** | **Tevaluate,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles)** |
|
| 2.56 | 58.88 x K4 (23 x K4) | 2.56 x K4 (1 x K4) | 7.68 x K4 (3 x K4) |
| 5.12 | 117.76 x K4 (23 x K4) | 5.12 x K4 (1 x K4) | 10.24 x K4 (2 x K4) |
| 10.24 | 235.52 x K4 (23 x K4) | 10.24 x K4 (1 x K4) | 20.48 x K4 (2 x K4) |
| Note 1: K4 = 6 is the measurement relaxation factor applicable for UE fulfilling the *stationaryMobilityEvaluation* [2] criterion. |

Table 4.2B.2.10.2-4: Tdetect,NR\_Inter\_RedCap\_Relax, Tmeasure,NR\_Inter\_RedCap\_Relax and Tevaluate,NR\_Inter\_RedCap\_Relax for UE configured with eDRX\_IDLE cycle (Frequency range FR2) for eDRX\_IDLE cycle upto 10.24 s

|  |  |  |  |
| --- | --- | --- | --- |
| **eDRX\_IDLE cycle length [s]** | **Tdetect,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles)** | **Tmeasure,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles)** | **Tevaluate,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles)** |
|
| 2.56 | 58.88 x N1 x K3 (23 x N1 x K3) | 2.56 x N1 x K3 (1 x K3) | 7.68 x N1 x K3 (3 x N1 x K3) |
| 5.12 | 117.76 x N1 x K3 (23 x N1 x K3) | 5.12 x N1 x K3 (1 x N1 x K3) | 10.24 x N1 x K3 (2 x N1 x K3) |
| 10.24 | 235.52 x N1 x K3 (23 x N1 x K3) | 10.24 x N1 x K3 (1 x N1 x K3) | 20.48 x N1 x K3 (2 x N1 x K3) |
| Note 1: K3 = 6 is the measurement relaxation factor applicable for UE fulfilling the stationaryMobilityEvaluation [2] criterion. |

Table 4.2B.2.10.2-5: Tdetect,NR\_Inter\_RedCap\_Relax, Tmeasure,NR\_ Inter \_RedCap\_Relax and Tevaluate,NR\_ Inter \_RedCap\_Relax for UE configured with eDRX\_IDLE cycle (Frequency range FR1) for eDRX\_IDLE cycle larger than 10.24 s

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **eDRX\_IDLE cycle length [s]** | **DRX cycle length [s]** | **PTW length [s] (number of 1.28s periods)** | **Tdetect,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles or eDRX cycles Note 3)** | **Tmeasure,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles or eDRX cycles Note 3)** | **Tevaluate,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles or eDRX cycles Note 3)** |
| 20.48 ≤ eDRX\_IDLE cycle length ≤10485.76 | 0.32 | ≥[1.28] ([1]) | $$eDRX\\_cycle\\_length×\left⌈\frac{23}{PTW/DRX\\_cycle\\_length}\right⌉x K3$$(23 x K3) | 0.32 x M2 x K3 (1 x M2 x K3) | 0.64 x M2 x K3 (2 x M2 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: The lower bound of PTW length is derived based on $\left⌈\frac{Tevaluate,NR\\_Inter\\_RedCap\*DRX\\_cycle}{1.28}\right⌉\*1.28$.Note 4: K4 = 6 is the measurement relaxation factor applicable for UE fulfilling the stationaryMobilityEvaluation [2] criterion. |

Table 4.2B.2.10.2-6: Tdetect,NR\_Inter\_RedCap\_Relax, Tmeasure,NR\_Inter\_RedCap\_Relax and Tevaluate,NR\_Inter\_RedCap\_Relax for UE configured with eDRX\_IDLE cycle (Frequency range FR2) for eDRX\_IDLE cycle larger than 10.24 s

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **eDRX\_IDLE cycle length [s]** | **DRX cycle length [s]** | **PTW length [s] (number of 1.28s periods)** | **Scaling Factor (N1)** Note1 | **Tdetect,NR\_Inter\_RedCap\_Relax [s] (number of DRX cycles or eDRX cycles Note 3)** | **Tmeasure,NR\_Inter\_RedCap\_Relax** **[s] (number of DRX cycles or eDRX cycles Note 3)** | **Tevaluate,NR\_Inter\_RedCap\_Relax****[s] (number of DRX cycles or eDRX cycles Note 3)** |
| 20.48 ≤ eDRX\_IDLE cycle length ≤10485.76 | 0.32 | ≥5.12 (4) | 8 | K3 x $eDRX\\_cycle\\_length×\left⌈\frac{23×N1}{PTW/DRX\\_cycle\\_length}\right⌉$(23 x N1 x K3) | 0.32 x N1 x K3 (1 x N1 x K3) | 0.64 x N1 x K3 (2 x N1 x K3) |
| 0.64 | ≥6.4 (5) | 5 | 0.64 x N1 x K3 (1 x N1 x K3) | 1.28 x N1 x K3 (2 x N1 x K3) |
| 1.28 | ≥10.24 (8) | 4 | 1.28 x N1 x K3 (1 x N1 x K3) | 2.56 x N1 x K3 (2 x N1 x K3) |
| 2.56 | ≥15.36 (12) | 3 | 2.56 x N1 x K3 (1 x N1 x K3) | 5.12 x N1 x K3 (2 x N1 x K3) |
| Note 1: Applies for RedCap UE of all supporting FR2 power classes.Note 2: The number of DRX cycles in this table is given for the DRX cycles within PTWs.Note 3: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].Note 4: The lower bound of PTW length is derived based on $\left⌈\frac{Tevaluate,NR\\_Inter\\_RedCap\*DRX\\_cycle}{1.28}\right⌉\*1.28$.Note 5: K4 = 6 is the measurement relaxation factor applicable for UE fulfilling the stationaryMobilityEvaluation [2] criterion. |

<End of Change 1>

<Start of Change 2>

##### 4.2B.2.10.3 Measurements for a UE fulfilling stationary not at cell edge criterion

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

- UE is configured with both *stationaryMobilityEvaluation* [2] criterion and *cellEdgeEvaluationWhileStationary* [2] criterion, and

- has also fulfilled both criteria, and

- less than 4 hours have passed since measurements for cell reselection were last performed, and

In this case the UE is not required to meet Tdetect,NR\_Inter\_RedCap, Tmeasure,NR\_Inter\_RedCap and Tevaluate,NR\_Inter\_RedCap as defined in clause 4.2B.2.4.

When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, the UE shall search for, measure and evaluate inter-frequency layers of higher, equal or lower priority at least every 4 hours.

When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, the UE shall search for inter-frequency layers of higher priority at least every K2\*Thigher\_priority\_search where Thigher\_priority\_search is described in clause 4.2.2.7 and K2=240.

In addition the the conditions listed above, if the UE is configured with eDRX\_IDLE cycle ≤ [163.84] sec then the UE is not required to meet Tdetect,NR\_Intra\_RedCap, Tmeasure,NR\_Intra\_RedCap and Tevaluate,NR\_Intra\_RedCap as defined in clause 4.2B.2.4 and evaluation/measurement time with relaxation on one carrier is not greater than single PTW window length.

<End of Change 2>