**3GPP RAN WG4 Meeting #94-e R4-2002271**

**Online, 24th February – 6th March 2020**

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| *CR-Form-v11.4* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **36.133** | **CR** | **6803** | **rev** | **1** | **Current version:** | **16.4.0** |  |
|  | | | | | | | | |
| *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 non-anchor RRM measurement requirements in Rel-16 NB IoT | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NB\_IOTenh3-Core | | | | |  | ***Date:*** | | | 2020-01-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Implement non-anchor RRM measurement requirements in normal coverage. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add the conditons for non-anchor paging carrier RRM measurement in measurment requirements for NB-IoT. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The requirements are missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.6.2.1, 4.6.2.1A | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

## **<<Start of Change 1>>**

#### 4.6.2.1 Measurement and evaluation of serving NB-IoT cell for UE category NB1 in normal coverage

The UE shall measure the NRSRP and NRSRQ level of the serving NB-IoT cell and evaluate the cell selection criterion S defined in [1] for the serving NB-IoT cell at least every DRX cycle. The UE is allowed to measure NRSRP level of the serving NB-IoT cell on non-anchor where the UE performs paging message reception provided that

* The relaxed monitoring criteria defined in TS 36.304 clause 5.2.4.12 are met, and
* Transmit power difference of the signals/channels between anchor- and non-anchor carriers is signalled to the UE via the existing parameter *nrs-PowerOffsetNonAnchor*, and
* UE is not configured with any positioning measurements.

The UE shall filter the NRSRP and NRSRQ measurements of the NB-IoT serving 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 DRX cycle/2.

If the UE is not configured with eDRX\_IDLE cycle and has evaluated according to Table 4.6.2.1-1 in Nserv\_NB-IoT-NC consecutive DRX cycles that the serving NB-IoT cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving NB-IoT cell, regardless of the measurement rules currently limiting UE measurement activities. If the UE is configured with eDRX\_IDLE cycle and has evaluated according to Table 4.6.2.1-2 in Nserv\_NB-NC consecutive DRX cycles within a single PTW that the serving NB-IoT cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving NB-IoT cell, regardless of the measurement rules currently limiting UE measurement activities.

If the UE in RRC\_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency and inter-frequency information indicated in the system information during the time T, the UE shall initiate cell selection procedures for the selected PLMN as defined in [1], where T=40 s if the UE is not configured with eDRX\_IDLE cycle, and T=MAX(40 s, one eDRX\_IDLE cycle) if the UE is configured with eDRX\_IDLE cycle.

Table 4.6.2.1-1: Nserv\_NB--NC

|  |  |
| --- | --- |
| DRX cycle length [s] | Nserv\_NB-IoT-NC [number of DRX cycles] |
| 1.28 | 2 |
| 2.56 | 2 |
| 5.12 | 2 |
| 10.24 | 2 |

Table 4.6.2.1-2: Nserv\_NB-NCfor UE configured with eDRX\_IDLE cycle

|  |  |  |  |
| --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | Nserv\_NB-IoT-NC [number of DRX cycles] |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 1.28 | ≥5.12 (2) | 2 |
| 2.56 | ≥7.68 (3) | 2 |
| 5.12 | ≥12.8 (5) | 2 |
| 10.24 | ≥23.04 (9) | 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 X of TS 24.008 [34]. | | | |

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 has to meet the requirement corresponding to the second state.

## **<<End of Change 1>>**

## **<<Start of Change 2>>**

#### 4.6.2.1A Measurement and evaluation of serving NB-IoT cell for HD-FDD UE category NB1 in normal coverage when configured with WUS

The UE which supports *wakeUpSignal* [2] shall meet the requirement defined for the DRX cycle length of N\*DRX\_cycle in Section 4.6.2.1, provided the following conditions are met:

- WUS has been configured in the serving NB-IoT cell using *WUS-Config-NB-r15* [2], and

- The serving cell measurement relaxation is signalled as ***n*** by the network using *numDRX-CycleRelaxed-r15*, and

- Serving cell S criteria is met with at least 2 dB margin.

- the relaxed monitoring criteria for neighbour cells in TS 36.304 [1] clause 5.2.4.12.1 is fulfilled, and

, where the relaxation factor N is given by Table 4.6.2.1A-1. Otherwise the requirements defined for the configured DRX cycle length in Section 4.6.2.1 shall apply.

The UE is allowed to measure NRSRP level of the serving NB-IoT cell on non-anchor where the UE performs paging message reception provided that the same conditons in section 4.6.2.1 are met.

.The UE shall further meet the requirements in section 4.6.2.1 during time period T0 after following occasions:

- after the end of reception of latest paging message, or

- from the moment UE has switched from RRC\_CONNECTED state to RRC\_IDLE state.

T0 = N\*DRX cycle if the UE is not configured with eDRX\_IDLE cycle where the value of N specified in Table 4.6.2.1A-1;

T0 = one eDRX IDLE cycle if the UE is configured with eDRX\_IDLE cycle;

Table 4.6.2.1A-1: The relaxation factor N for a UE not configured with eDRX IDLE cycle

|  |  |
| --- | --- |
| DRX cycle length [s] | Value |
| 1.28 | Min(***n*** , 8) |
| 2.56 | Min(***n*** , 4) |
| 5.12 | Min(***n*** , 2) |
| 10.24 | 1 |
| NOTE: ***n*** is signalled by the network by using *numDRX-CycleRelaxed-r15* defined in TS 36.331 [2]. | |

Table 4.6.2.1A-2: The relaxation factor N for a UE configured with eDRX IDLE cycle

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DRX cycle length [s] | Value | | | |
| 5.12 ≤ PTW length [s] < 7.68 | 7.68 ≤ PTW length [s] < 12.8 | 12.8 ≤ PTW length [s] < 23.04 | 23.04 ≤ PTW length [s] |
| 1.28 | 1 | Min(***n*** , 2) | Min(***n*** , 4) | Min(***n*** , 8) |
| 2.56 | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) |
| 5.12 | N/A | N/A | 1 | Min(***n*** , 2) |
| 10.24 | N/A | N/A | N/A | 1 |
| NOTE: ***n*** is signalled by the network by using *numDRX-CycleRelaxed-r15* defined in TS 36.331 [2]. | | | | |

## **<<End of Change 2>>**