**3GPP TSG-RAN4 Meeting #97-e *R4-2017074***

**Electronic Meeting, 2nd Nov 2020 – 13th Nov 2020**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **36.133** | **CR** | **6971** | **rev** | **1** | **Current version:** | **16.7.0** |  |
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| *For* [***HELP***](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 RRM requirements for short DRX with eDRX configured for Rel-16 NB-IoT  |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon, Mediatek Inc. |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NB\_IOTenh3-Core |  | ***Date:*** | 2020-11-11 |
|  |  |  |  |  |
| ***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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | 1. In the current requirements for the new introduced short DRX cycle length 320 ms and 640 ms, the measurement requirement Tmeasure for neighbor cell measurement and ECID is scaled, which means UE does not need to perform measurement too frequently with the short DRX cycles. However, when eDRX is configured, the corresponding requirements are not relaxed in order to let UE complete the measurement within the same PTW as possible. It could be observed that the minimum configurable PTW length is 2.56 s, which allows multiple measurement occasions when DRX is 320 ms. It is proposed in this paper to also scale the requirements when eDRX is configured, as the benefit to let UE perform measurement every short DRX when eDRX is configured is not significant but it will lead to unnecessary power consumption and UE’s efforts. The same changes are made in ECID. 2. There are some typos and misalignments in the spec need to be fixed. |
|  |  |
| ***Summary of change:*** | 1. Tmeasure for short DRX is scaled when eDRX is configured for intra/inter measurement for cell re-selection and ECID in the same way when eDRX is not configured.2. Some typos and misalignments in the spec are fixed. |
|  |  |
| ***Consequences if not approved:*** | The requirements are not appropriate and there are misalignment exsiting. |
|  |  |
| ***Clauses affected:*** | 4.6.2 & 4.8 |
|  |  |
|  | **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:*** |  |

### <Start of Change 1>

### 4.6.2 Cell Re-selection

The cell reselection procedure allows the UE to select a more suitable cell and camp on it.

When the UE is in either *Camped* *Normally* state or *Camped on Any Cell* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency and inter-frequency cells indicated by the serving NB-IoT cell. For intra-frequency and inter-frequency cells the serving NB-IoT cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS36.304, allowing the UE to limit its measurement activity.

#### 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 on the anchor carrier and evaluate the cell selection criterion S defined in clause 5.2.3.2 in [1] for the serving NB-IoT cell on the anchor carrier at least every DRX cycle.

If the UE is configured for receiving paging on the non-anchor carrier then the UE shall evaluate the cell selection criterion S defined in clause 5.2.3.2a in [1] for the serving NB-IoT cell on non-anchor carrier at least every DRX cycle.

The UE is allowed to measure NRSRP level of the serving NB-IoT cell, assuming that *nrs-NonAnchor-config* is enabled indicated by higher layer defined in clause 10.2.6 TS 36.211 [16], on non-anchor carrier provided that:

- The relaxed monitoring criteria defined in TS 36.304 clause 5.2.4.12 are met,

- 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.

When UE measures the NRSRP on non-anchor carrier, UE shall compare the measurements from anchor carrier and non-anchor carrier at least once every one hour by the following inequality:

| NRSRPanchor – (NRSRPnon-anchor - *nrs-PowerOffsetNonAnchor*) | ≤ 10 dB

where NRSRPanchor is the NRSRP measurement on anchor carrier and NRSRPnon-anchor is the NRSRP measurement on non-anchor carrier. The measurement for comparison shall use at least 2 measurements for filtering. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least DRX cycle/2. If the measurement for comparison satisfy the inequality, UE is allowed to perform RRM measurements on the non-anchor carrier until the next comparison takes place or until the relaxed monitoring conditions are no longer met. UE shall perform NRSRP measurement on anchor carrier if the inequality is not satisfied until the next comparison takes place.

If the UE is not configured with eDRX\_IDLE cycle and has evaluated according to Table 4.6.2.1-1 in Nserv\_NB -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] |
| 0.32 | 2 |
| 0.64 | 2 |
| 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 | 0.32 | ≥2.56 (1) | 2 |
| 0.64 | ≥2.56 (1) | 2 |
| 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.

#### 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 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 |
| 0.32 | Min(*n* , 8) |
| 0.64 | Min(*n* , 8) |
| 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 |
| 2.56 ≤ PTW length [s] < 5.12 | 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]  |
| 0.32 | Min(*n* , 2) | Min(*n* , 4) | Min(*n* , 8) | Min(*n* , 8) | Min(*n* , 8) |
| 0.64 | 1 | Min(*n* , 2) | Min(*n* , 4) | Min(*n* , 8) | Min(*n* , 8) |
| 1.28 | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) | Min(***n*** , 8) |
| 2.56 | N/A | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) |
| 5.12 | N/A | N/A | N/A | 1 | Min(***n*** , 2) |
| 10.24 | N/A | 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]. |

#### 4.6.2.2 Measurements of intra-frequency NB-IoT cells for UE category NB1 in normal coverage

The UE shall be able to identify new intra-frequency cells and perform NRSRP measurements of identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS36.304 within Tdetect,NB\_Intra\_NCwhen Treselection= 0. An intra frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot defined in Annex B.1.4 for a corresponding Band.

The UE shall measure NRSRP at least every Tmeasure,NB\_Intra\_NC for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter NRSRP measurements of each measured intra-frequency 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,NB\_Intra-NC/2

The UE shall not consider an NB-IoT neighbour cell in cell reselection if it is indicated as not allowed in the measurement control system information of the serving NB-IoT cell.

For an intra-frequency 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 the intra-frequency cell has met reselection criterion defined [1] within Tevaluate,NB\_intra-NC when Treselection = 0, provided that the cell is at least XdB better ranked, where ‘X’ is specified in Table 4.6.2.4-3. When evaluating cells for reselection, the side conditions for NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot apply to both serving and non-serving NB-IoT intra-frequency cells.

If Treselection timer has a non zero value and the intra-frequency cell is better ranked than the serving NB-IoT cell, the UE shall evaluate this intra-frequency cell for the Treselection time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX\_IDLE cycle, Tdetect,NB\_Intra\_NC, Tmeasure,NB\_Intra\_NC and Tevaluate, NB\_intra\_NC are specified in Table 4.6.2.2-1. For UE configured with eDRX\_IDLE cycle, Tdetect,NB\_Intra -NC, Tmeasure,NB\_Intra\_NC and Tevaluate, NB\_intra-NC are specified in Table 4.6.2.2-2, where the requirements apply provided that the serving NB-IoT cell is configured with eDRX\_IDLE and is the same in all PTWs during any of Tdetect,NB\_Intra\_NC, Tmeasure,NB\_Intra\_NC and Tevaluate, NB\_intra\_NC when multiple PTWs are used.

Table 4.6.2.2-1 : Tdetect,NB\_Intra-NC, Tmeasure,NB\_Intra-NC and Tevaluate, NB\_intra-NC

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Tdetect,NB\_Intra\_NC [s] (number of DRX cycles) | Tmeasure,NB\_Intra\_NB\_NC [s] (number of DRX cycles) | Tevaluate,NB\_intra\_NB\_NC[s] (number of DRX cycles) |
| 0.32 | 26 (80) | 1.28 (4) | 5.12 (16) |
| 0.64 | 26 (40) | 1.28 (2) | 5.12 (8) |
| 1.28 | 51 (40) | 1.28 (1) | 6.5 (5) |
| 2.56 | 51 (20) | 2.56 (1) | 7.68 (3) |
| 5.12 | 102 (20) | 5.12 (1) | 10.24 (2) |
| 10.24 | 102 (10) | 10.24 (1) | 20.48 (2) |

Table 4.6.2.2-2: Tdetect,NB\_Intra\_NC, Tmeasure,NB\_Intra\_NC and Tevaluate,NB\_intra\_NC for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | Tdetect,NB\_Intra-NC [s] (number of DRX cycles) | Tmeasure,NB\_Intra\_NC [s] (number of DRX cycles) | Tevaluate,NB\_intra\_NC[s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 2.56 (1) |  (20) | 1.28 (4) | 2.56 (8) |
| 0.64 | ≥ 2.56 (1) | 1.28 (2) | 2.56 (4) |
| 1.28 | ≥ 5.12 (2) | 1.28 (1) | 2.56 (2) |
| 2.56 | ≥ 7.68 (3) | 2.56 (1) | 5.12 (2) |
| 5.12 | ≥ 12.8 (5) | 5.12 (1) | 10.24 (2) |
| 10.24 | ≥ 23.04 (9) | 10.24 (1) | 20.48 (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.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 [1] are fulfilled then the UE’s intra-frequency measurement is not required to meet Tdetect,NB\_Intra\_NC, Tmeasure,NB\_Intra\_NC and Tevaluate,NB\_intra\_NC as defined in Table 4.6.2.2-1 and Table 4.6.2.2-2.

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

The UE shall measure the NRSRP and NRSRQ level of the serving NB-IoT cell on the anchor carrier and evaluate the cell selection criterion S defined in clause 5.2.3.2 in [1] for the serving NB-IoT cell on the anchor carrier at least every DRX cycle.

If the UE is configured for receiving paging on the non-anchor carrier then the UE shall evaluate the cell selection criterion S defined in clause 5.2.3.2a in [1] for the serving NB-IoT cell on non-anchor carrier at least every DRX cycle.

The UE is allowed to measure NRSRP level of the serving NB-IoT cell, assuming that *nrs-NonAnchor-config* is enabled indicated by higher layer defined in clause 10.2.6 TS 36.211 [16], on non-anchor carrier provided that:

- The relaxed monitoring criteria defined in TS 36.304 clause 5.2.4.12 are met,

- Transmit power difference of the signals/channels between anchor- and non-anchor carriers is signalled to the UE, via the existing parameter *nrs-PowerOffsetNonAnchor*,

- UE is not configured with any positioning measurements.

*- nB* configured by higher layer is not equal to *4T.*

The UE shall filter the NRSRP and NRSRQ measurements of the serving NB-IoT cell using at least 4 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 4.6.2.3-1 in Nserv\_NB\_EC 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 4.6.2.3-2 in Nserv\_NB-EC 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= 80 s if the UE is not configured with eDRX\_IDLE cycle, and T=MAX(80 s, one eDRX\_IDLE cycle) if the UE is configured with eDRX\_IDLE cycle.

Table 4.6.2.3-1: Nserv\_NB\_EC

|  |  |
| --- | --- |
| DRX cycle length [s] | Nserv\_NB-EC [number of DRX cycles] |
| 0.32 | 4 |
| 0.64 | 4 |
| 1.28 | 4 |
| 2.56 | 4 |
| 5.12 | 4 |
| 10.24 | 4 |

Table 4.6.2.3-2: Nserv\_NB\_ECfor 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\_EC [number of DRX cycles] |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 2.56 (1) | 4 |
| 0.64 | ≥ 5.12 (2) | 4 |
| 1.28 | ≥ 7.68 (3) | 4 |
| 2.56 | ≥ 12.8 (5) | 4 |
| 5.12 | ≥ 23.04 (9) | 4 |
| 10.24 | ≥ 43.52 (17) | 4 |
| 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.

#### 4.6.2.3A Measurement and evaluation of serving NB-IoT cell for HD-FDD UE category NB1 in enhanced 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 4.6.2.3, 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 4.6.2.3A-1. Otherwise the requirements defined for the configured DRX cycle length in Section 4.6.2.3 shall apply.

The UE shall further meet the requirements in section 4.6.2.3 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 4.6.2.3A-1;

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

Table 4.6.2.3A-1: The relaxation factor N for a UE not configured with eDRX IDLE cycle

|  |  |
| --- | --- |
| DRX cycle length [s] | Value |
| 0.32 | Min(***n*** , 8) |
| 0.64 | Min(***n*** , 8) |
| 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 4.6.2.3A-2: The relaxation factor N for a UE configured with eDRX IDLE cycle

|  |  |
| --- | --- |
| DRX cycle length [s] | Value |
| 2.56 ≤ PTW length [s] < 5.12 | 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] < 43.52 | 43.52 ≤ PTW length [s]  |
| 0.32 | 1 | Min(*n* , 2) | Min(*n* , 4) | Min(*n* , 8) | Min(*n* , 8) | Min(*n* , 8) |
| 0.64 | N/A | 1 | Min(*n* , 2) | Min(*n* , 4) | Min(*n* , 8) | Min(*n* , 8) |
| 1.28 | N/A | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) | Min(***n*** , 8) |
| 2.56 | N/A | N/A | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) |
| 5.12 | N/A | N/A | N/A | N/A | 1 | Min(***n*** , 2) |
| 10.24 | N/A | N/A | 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]. |

#### 4.6.2.4 Measurements of intra-frequency NB-IoT cells for UE category NB1 in enhanced coverage

The UE shall be able to identify new intra-frequency cells and perform NRSRP measurements of identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS36.304 within Tdetect,NB\_Intra\_ECwhen that Treselection= 0. An intra frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot defined in Annex B.1.4 for a corresponding Band.

The UE shall measure NRSRP at least every Tmeasure,NB\_Intra\_EC for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter NRSRP measurements of each measured intra-frequency 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,NB\_Intra\_ EC/2

The UE shall not consider a NB-IoT neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving NB-IoT cell.

For an intra-frequency 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 the intra-frequency cell has met reselection criterion defined [1] within Tevaluate,NB\_intra\_EC when Treselection = 0, provided that the cell is at least XdB better ranked, where ‘X’ is specified in Table 4.6.2.4-3. When evaluating cells for reselection, the side conditions for NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot apply to both serving and non-serving NB-IoT intra-frequency cells.

If Treselection timer has a non zero value and the intra-frequency cell is better ranked than the serving NB-IoT cell, the UE shall evaluate this intra-frequency cell for the Treselection time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX\_IDLE cycle, Tdetect,NB\_Intra\_EC, Tmeasure,NB\_Intra\_EC and Tevaluate, NB\_intra\_EC are specified in Table 4.6.2.4-1. For UE configured with eDRX\_IDLE cycle, Tdetect,NB\_Intra\_EC, Tmeasure,NB\_Intra\_EC and Tevaluate, NB\_intra\_EC are specified in Table 4.6.2.4-2, where the requirements apply provided that the serving NB-IoT cell is configured with eDRX\_IDLE and is the same in all PTWs during any of Tdetect,NB\_Intra\_EC, Tmeasure,NB\_Intra\_EC and Tevaluate, NB\_intra\_EC when multiple PTWs are used.

Table 4.6.2.4-1 : Tdetect,NB\_Intra\_EC, Tmeasure,NB\_Intra\_EC and Tevaluate, NB\_intra\_EC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SCH Ês/Iot of neighboring cell: Q2 | DRX cycle length [s] | Tdetect,NB\_Intra\_ EC [s] (number of DRX cycles) | Tmeasure,NB\_Intra\_ EC [s] (number of DRX cycles) | Tevaluate,NB\_intra\_ EC[s] (number of DRX cycles) |
| **-15≤ Q2 < -6** | 0.32 | 256 (800) | 1.28 (4) | 10.24 (32) |
| 0.64 | 266 (415) | 1.28 (2) | 10.24 (16) |
| 1.28 | 532 (415)  | 1.28 (1) | 12.8 (10) |
| 2.56 | 532 (208)  | 2.56 (1) | 15.36 (6) |
| 5.12 | 1063 (208)  | 5.12 (1) | 20.48 (4) |
| 10.24 | 1063 (104)  | 10.24 (1) | 30.72 (3) |
| **Q2≥-6** | 0.32 | 26 (80) | 1.28 (4) | 10.24 (32) |
| 0.64 | 29 (45) | 1.28 (2) | 10.24 (16) |
| 1.28 | 58 (45) | 1.28 (1) | 12.8 (10) |
| 2.56 | 59 (23) | 2.56 (1) | 15.36 (6) |
| 5.12 | 113 (22) | 5.12 (1) | 20.48 (4) |
| 10.24 | 113 (11) | 10.24 (1) | 30.72 (3) |

Table 4.6.2.4-2: Tdetect,NB\_Intra\_EC, Tmeasure,NB\_Intra\_EC and Tevaluate,NB\_intra\_EC for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | Tdetect,NB\_Intra\_EC [s] (number of DRX cycles) | Tmeasure,NB\_Intra\_EC [s] (number of DRX cycles) | Tevaluate,NB\_intraEC[s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) |  (406) | 1.28 (4) | 10.24 (32) |
| 0.64 | ≥12.8 (5) | 1.28 (2) | 10.24 (16) |
| 1.28 | ≥15.36 (6) | 1.28 (1) | 12.8 (10) |
| 2.56 | ≥17.92 (7) | 2.56 (1) | 15.36 (6) |
| 5.12 | ≥23.04 (9) | 5.12 (1) | 20.48 (4) |
| 10.24 | ≥33.28 (13) | 10.24 (1) | 30.72 (3) |
| 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]. |

Table 4.6.2.4-3: Conditions on NSCH Ês/Iot of identified and of the neighbour cell

|  |  |  |
| --- | --- | --- |
| NSCH Ês/Iot of already identified cell including serving cell: Q1 | Neighbouring cell NSCH Ês/Iot: Q2 | Cell Reselection Margin‘X’ |
| -15≤Q1<-6 | -15≤ Q2 < -6 | 8.3 |
| -15≤Q1<-6 | Q2 -6 | 8.3 |
| Q1 -6 | Q2 -6 | 4 |

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.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 [1] are fulfilled then the UE’s intra-frequency measurement is not required to meet Tdetect,NB\_Intra\_EC, Tmeasure,NB\_Intra\_EC and Tevaluate,NB\_intra\_EC as defined in Table 4.6.2.4-1 and Table 4.6.2.4-2.

#### 4.6.2.5 Measurements of inter-frequency NB cells for UE category NB1 in normal coverage

The UE shall be able to identify new inter-frequency cells and perform NRSRP measurements of identified inter-frequency cells if carrier frequency information is provided by the serving NB-IoT cell, even if no explicit neighbour list with physical layer cell identities is provided.

If Srxlev ≤ SnonIntraSearchP then the UE shall search for and measure inter-frequency layers in preparation for possible reselection.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS36.304 within Pcarrier \* Tdetect,NB\_Inter\_NC, and able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS36.304 within Nfreq\_NB-IoT \* Tdetect,NB\_Inter\_NC if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving NB-IoT cells when Treselection = 0 provided that the reselection criteria is met by a margin of at least 5dB for reselections.An inter-frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NB-IoT\_SCH\_RP and SCH Ês/Iot defined in Annex B.1.5 for a corresponding Band.

The UE shall filter NRSRP measurements of each measured inter-frequency 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, NB\_Inter\_NC/2.

If an inter-frequency cell 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 the inter-frequency cell has met reselection criterion defined TS 36.304 within Pcarrier \* Tevaluate,NB\_Inter\_NC. When evaluating cells for reselection, the side conditions for NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot apply to both serving and inter-frequency cells.

If Treselection timer has a non zero value and the inter-frequency cell is better ranked than the serving NB-IoT cell, the UE shall evaluate this inter-frequency cell for the Treselection time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX\_IDLE cycle, Tdetect,NB\_Inter\_NC, Tmeasure,NB\_Inter\_NC and Tevaluate, NB\_inter\_NC are specified in Table 4.6.2.5-1 for the UE in normal coverage. For UE configured with eDRX\_IDLE cycle, Tdetect,NB\_Inter\_NC, Tmeasure,NB\_Inter\_NC and Tevaluate, NB\_inter\_NC are specified in Table 4.6.2.5-2 for the UE in normal coverage, where the requirements apply provided that the serving NB-IoT cell is configured with eDRX\_IDLE and is the same in all PTWs during any of Tdetect,NB\_Inter\_NC, Tmeasure,NB\_Inter\_NC and Tevaluate, NB\_inter\_NC when multiple PTWs are used.

Table 4.6.2.5-1 : Tdetect,NB\_Inter\_NC, Tmeasure,NB\_Inter\_NC and Tevaluate,NB\_Inter\_NC

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Tdetect,NB\_Inter\_ NC [s] (number of DRX cycles) | Tmeasure,NB\_Inter\_ NC [s] (number of DRX cycles) | Tevaluate,NB\_Inter\_ NC[s] (number of DRX cycles) |
| 0.32 | 26 (80) | 1.28 (4) | 5.12 (16) |
| 0.64 | 26 (40) | 1.28 (2) | 5.12 (8) |
| 1.28 | 51 (40) | 1.28 (1) | 6.5 (5) |
| 2.56 | 51 (20) | 2.56 (1) | 7.68 (3) |
| 5.12 | 102 (20) | 5.12 (1) | 10.24 (2) |
| 10.24 | 102 (10) | 10.24 (1) | 20.48 (2) |

Table 4.6.2.5-2: Tdetect,NB\_Inter\_ NC, Tmeasure,NB\_Inter\_NC and Tevaluate, NB\_inter\_ NC for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | Tdetect,NB\_Inter\_NC [s] (number of DRX cycles) | Tmeasure,NB\_Inter\_NC [s] (number of DRX cycles) | Tevaluate,NB\_inter\_ NC[s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 2.56 (1) |  (20) | 1.28 (4) | 2.56 (8) |
| 0.64 | ≥ 2.56 (1) | 1.28 (2) | 2.56 (4) |
| 1.28 | ≥5.12 (2) | 1.28 (1) | 2.56 (2) |
| 2.56 | ≥7.68 (3) | 2.56 (1) | 5.12 (2) |
| 5.12 | ≥12.8 (5) | 5.12 (1) | 10.24 (2) |
| 10.24 | ≥23.04 (9) | 10.24 (1) | 20.48 (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.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 [1] are fulfilled then the UE’s inter-frequency measurement is not required to meet Tdetect,NB\_Intra\_EC, Tmeasure,NB\_Intra\_EC and Tevaluate,NB\_intra\_EC as defined in Table 4.6.2.5-1 and Table 4.6.2.5-2.

#### 4.6.2.6 Measurements of inter-frequency NB-IoT cells for UE category NB1 in enhanced coverage

The UE shall be able to identify new inter-frequency cells and perform NRSRP measurements of identified inter-frequency cells if carrier frequency information is provided by the serving NB-IoT cell, even if no explicit neighbour list with physical layer cell identities is provided.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS36.304 within Pcarrier \* Tdetect,NB\_Inter\_EC. An inter-frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot defined in Annex B.1.5 for a corresponding Band.

The UE shall not cause any interruption to the paging reception and acquisition of SI while performing measurement on serving or any neighbor cells.

The UE shall filter NRSRP measurements of each measured inter-frequency 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,NB\_Inter\_EC/2.

If an inter-frequency cell 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 the inter-frequency cell has met reselection criterion defined TS 36.304 within Pcarrier \* Tevaluate,NB\_Inter\_EC. When evaluating cells for reselection, the side conditions for NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot apply to both serving and inter-frequency NB-IoT cells.

If Treselection timer has a non zero value and the inter-frequency cell is better ranked than the serving NB-IoT cell, the UE shall evaluate this inter-frequency cell for the Treselection time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For a UE not configured with eDRX\_IDLE cycle, Tdetect,NB\_Inter\_EC, Tmeasure,NB\_Inter\_EC and Tevaluate, NB\_inter\_EC are specified in Table 4.6.2.6-1. For UE configured with eDRX\_IDLE cycle, Tdetect,NB\_Inter\_EC, Tmeasure,NB\_Inter\_EC and Tevaluate, NB\_inter\_EC are specified in Table 4.6.2.6-2 for the UE in enhanced coverage, where the requirements apply provided that the serving NB-IoT cell is configured with eDRX\_IDLE and is the same in all PTWs during any of Tdetect,NB\_Inter\_EC, Tmeasure,NB\_Inter\_EC and Tevaluate, NB\_inter\_EC when multiple PTWs are used.

Table 4.6.2.6-1 : Tdetect,NB\_Inter\_EC, Tmeasure,NB\_Inter\_EC and Tevaluate,NB\_Inter\_EC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SCH Ês/Iot of neighboring cell: Q2 | DRX cycle length [s] | Tdetect,NB\_Inter\_ EC [s] (number of DRX cycles) | Tmeasure,NB\_Inter\_ EC [s] (number of DRX cycles) | Tevaluate,NB\_Inter\_ EC[s] (number of DRX cycles) |
| **-15≤ Q2 < -6** | 0.32 | 256 (800) | 1.28 (4) | 10.24 (32) |
| 0.64 | 266 (415) | 1.28 (2) | 10.24 (16) |
| 1.28 | 532 (415)  | 1.28 (1) | 12.8 (10) |
| 2.56 | 532 (208)  | 2.56 (1) | 15.36 (6) |
| 5.12 | 1063 (208)  | 5.12 (1) | 20.48 (4) |
| 10.24 | 1063 (104)  | 10.24 (1) | 30.72 (3) |
| **Q2≥-6** | 0.32 | 26 (80) | 1.28 (4) | 10.24 (32) |
| 0.64 | 29 (45) | 1.28 (2) | 10.24 (16) |
| 1.28 | 58 (45) | 1.28 (1) | 12.8 (10) |
| 2.56 | 59 (23) | 2.56 (1) | 15.36 (6) |
| 5.12 | 113 (22) | 5.12 (1) | 20.48 (4) |
| 10.24 | 113 (11) | 10.24 (1) | 30.72 (3) |

Table 4.6.2.6-2: Tdetect,NB\_Inter\_EC, Tmeasure,NB\_Inter\_EC and Tevaluate, NB\_inter\_EC for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **eDRX\_IDLE cycle length [s]** | **DRX cycle length [s]** | **PTW length [s]** **(number of 2.56s periods)** | **Tdetect,NB\_Inter\_EC [s] (number of DRX cycles)** | **Tmeasure,NB\_Inter\_EC [s] (number of DRX cycles)** | **Tevaluate,NB\_interEC****[s] (number of DRX cycles)** |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) |  ([406]) | 1.28 (4) | 10.24 (32) |
| 0.64 | ≥12.8 (5) | 1.28 (2) | 10.24 (16) |
| 1.28 | ≥15.36 (6) | 1.28 (1) | 12.8 (10) |
| 2.56 | ≥17.92 (7) | 2.56 (1) | 15.36 (6) |
| 5.12 | ≥23.04 (9) | 5.12 (1) | 20.48 (4) |
| 10.24 | ≥33.28 (13) | 10.24 (1) | 30.72 (3) |
| 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]. |

Table 4.6.2.6-3: Conditions on NSCH Ês/Iot of identified and of the neighbour cell

|  |  |  |
| --- | --- | --- |
| NSCH Ês/Iot of already identified cell including serving cell: Q1 | Neighbouring cell NSCH Ês/Iot: Q2 | Cell Reselection Margin‘Y’ |
| -15≤Q1<-6 | -15≤ Q2 < -6 | 9.3 |
| -15≤Q1<-6 | Q2-6 | 9.3 |
| Q1 -6 | Q2-6 | 5 |

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.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 [1] are fulfilled then the UE’s inter-frequency measurement is not required to meet Tdetect,NB\_Intra\_EC, Tmeasure,NB\_Intra\_EC and Tevaluate,NB\_intra\_EC as defined in Table 4.6.2.6-1 and Table 4.6.2.6-2.

### <End of Change 1>

### <Start of Change 2>

### 4.8.5 Intra-Frequency E-CID NRSRP and NRSRQ Measurements for UE category NB2 for normal coverage

UE shall follow the procedure for idle state positioning measurement as defined in [36] section 7.1.3.

The UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_NC\_ECID provided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID intra-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state.

For UE not configured with eDRX\_IDLE cycle, Tidentify\_intra\_NC\_ECID is as shown in Table 4.8.5-1. For UE configured with eDRX\_IDLE cycle, Tidentify\_intra\_NC\_ECID is as shown in Table 4.8.5-2.

Table 4.8.5-1: Requirement to identify a newly detectable intra-frequency cell for E-CID NRSRP/NRSRQ measurement

|  |  |  |
| --- | --- | --- |
| DRX cycle length [s] | Tdetect,NB\_Intra\_NC\_ECID [s] (number of DRX cycles) | Tmeasure\_Intra\_NC\_ECID [s] (number of DRX cycles) |
| 0.32 | 26 (80) | 1.28 (4) |
| 0.64 | 29 (45) | 1.28 (2) |
| 1.28 | 58 (45) | 1.28 (1) |
| 2.56 | 59 (23) | 2.56 (1) |
| 5.12 | 113 (22) | 5.12 (1) |
| 10.24 | 113 (11) | 10.24 (1) |

Table 4.8.5-2: Requirement to identify a newly detectable intra-frequency cell for E-CID NRSRP/NRSRQ measurement for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | Tdetect,NB\_Intra\_NC\_ECID [s] (number of DRX cycles) | Tmeasure\_Intra\_NC\_ECID [s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) |  (20) | 1.28 (4) |
| 0.64 | ≥12.8 (5) | 1.28 (2) |
| 1.28 | ≥15.36 (6) | 1.28 (1) |
| 2.56 | ≥17.92 (7) | 2.56 (1) |
| 5.12 | ≥23.04 (9) | 5.12 (1) |
| 10.24 | ≥33.28 (13) | 10.24 (1) |
| 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]. |

An intra frequency cell is considered to be detectable when the conditions for NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot defined in Annex B.1.4 are met for a corresponding Band.

For UE not configured with eDRX\_IDLE cycle, the measurement period for intra frequency measurements is Tmeasure\_intra\_NC\_ECID as shown in Table 4.8.5-1. For UE configured with eDRX\_IDLE cycle, the measurement period for intra frequency measurements is Tmeasure\_intra\_NC\_ECID as shown in Table 4.8.5-2.

The UE shall be capable of performing NRSRP and NRSRQ measurement for [1] identified intra-frequency cell, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of Tmeasure\_intra\_NC\_ECID .

The NRSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.22.1. The NRSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.22.3.

#### 4.8.5.1 Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.22.1 and 9.1.22.3.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled. The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air 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: *Nrep*x TTIDCCH, where *Nrep* [21] is the maximum number of NPUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x TTIDCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the idle mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in [36] for LPP measurement reporting.

### 4.8.6 Intra-Frequency E-CID NRSRP and NRSRQ Measurements for UE category NB2 for enhanced coverage

UE shall follow the procedure for idle state positioning measurement as defined in [36] section 7.1.3.

The UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_EC\_ECID provided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID intra-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state.

For UE not configured with eDRX\_IDLE cycle, Tidentify\_intra\_EC\_ECID is as shown in Table 4.8.6-1. For UE configured with eDRX\_IDLE cycle, Tidentify\_intra\_EC\_ECID is as shown in Table 4.8.6-2.

Table 4.8.6-1: Requirement to identify a newly detectable intra-frequency cell for E-CID NRSRP/NRSRQ measurement

|  |  |  |  |
| --- | --- | --- | --- |
| SCH Ês/Iot of neighboring cell: Q2 | DRX cycle length [s] | Tdetect,NB\_Intra\_ EC\_ECID [s] (number of DRX cycles) | Tmeasure,NB\_Intra\_ EC\_ECID [s] (number of DRX cycles) |
| -15≤ Q2 < -6 | 0.32 | 256 (800) | 1.28 (4) |
| 0.64 | 266 (415) | 1.28 (2) |
| 1.28 | 532 (415)  | 1.28 (1) |
| 2.56 | 532 (208)  | 2.56 (1) |
| 5.12 | 1063 (208)  | 5.12 (1) |
| 10.24 | 1063 (104)  | 10.24 (1) |
| Q2≥-6 | 0.32 | 26 (80) | 1.28 (4) |
| 0.64 | 29 (45) | 1.28 (2) |
| 1.28 | 58 (45) | 1.28 (1) |
| 2.56 | 59 (23) | 2.56 (1) |
| 5.12 | 113 (22) | 5.12 (1) |
| 10.24 | 113 (11) | 10.24 (1) |

Table 4.8.6-2: Requirement to identify a newly detectable intra-frequency cell for E-CID NRSRP/NRSRQ measurement for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SCH Ês/Iot of neighboring cell: Q2 | eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | Tdetect,NB\_Intra\_ EC\_ECID [s] (number of DRX cycles) | Tmeasure,NB\_Intra\_ EC\_ECID [s] (number of DRX cycles) |
| -15≤ Q2 < -6 | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) |  (406) | 1.28 (4) |
| 0.64 | ≥12.8 (5) | 1.28 (2) |
| 1.28 | ≥15.36 (6) | 1.28 (1) |
| 2.56 | ≥17.92 (7) | 2.56 (1) |
| 5.12 | ≥23.04 (9) | 5.12 (1) |
| 10.24 | ≥33.28 (13) | 10.24 (1) |
| Q2≥-6 | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) |  (20) | 1.28 (4) |
| 0.64 | ≥12.8 (5) | 1.28 (2) |
| 1.28 | ≥15.36 (6) | 1.28 (1) |
| 2.56 | ≥17.92 (7) | 2.56 (1) |
| 5.12 | ≥23.04 (9) | 5.12 (1) |
| 10.24 | ≥33.28 (13) | 10.24 (1) |
| 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]. |

An intra frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot defined in Annex B.1.4 for a corresponding Band.

For UE not configured with eDRX\_IDLE cycle, the measurement period for intra frequency measurements is Tmeasure\_intra\_EC\_ECID as shown in Table 4.8.6-1. For UE configured with eDRX\_IDLE cycle, the measurement period for intra frequency measurements is Tmeasure\_intra\_EC\_ECID as shown in Table 4.8.6-2.

The UE shall be capable of performing NRSRP and NRSRQ measurement for at least 1 identified intra-frequency cell, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of Tmeasure\_intra\_EC\_ECID.

The NRSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.22.1. The NRSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.22.3.

#### 4.8.6.1 Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.22.1 and 9.1.22.3.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air 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: *Nrep*x TTIDCCH, where *Nrep* [21] is the maximum number of NPUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x TTIDCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the idle mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in [36] for LPP measurement reporting.

### 4.8.7 Inter-Frequency E-CID NRSRP and NRSRQ Measurements for UE category NB2 for normal coverage

UE shall follow the procedure for idle state positioning measurement as defined in [36] section 7.1.3.

The UE shall be able to identify a new detectable inter frequency cell according to the following expression provided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID inter-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state:

Tidentify\_inter\_NC\_ECID= Nfreq\_NB\_ECID•Tidentify\_inter\_NC\_perCC\_ECID

Where Nfreq\_NB\_ECID is the total number of inter frequency carriers UE measures provided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID inter-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state.

For UE not configured with eDRX\_IDLE cycle, Tidentify\_inter\_NC\_perCC\_ECID is as shown in Table 4.8.7-1. For UE configured with eDRX\_IDLE cycle, Tidentify\_inter\_NC\_perCC\_ECID is as shown in Table 4.8.7-2.

Table 4.8.7-1: Requirement to identify a newly detectable inter-frequency cell for E-CID NRSRP/NRSRQ measurement

|  |  |  |
| --- | --- | --- |
| DRX cycle length [s] | Tdetect,NB\_Inter\_NC\_perCC\_ECID [s] (number of DRX cycles) | Tmeasure\_Inter\_NC\_ECID [s] (number of DRX cycles) |
| 0.32 | 26 (80) | 1.28 (4) |
| 0.64 | 29 (45) | 1.28 (2) |
| 1.28 | 58 (45) | 1.28 (1) |
| 2.56 | 59 (23) | 2.56 (1) |
| 5.12 | 113 (22) | 5.12 (1) |
| 10.24 | 113 (11) | 10.24 (1) |

Table 4.8.7-2: Requirement to identify a newly detectable inter-frequency cell for E-CID NRSRP/NRSRQ measurement for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | Tdetect,NB\_Inter\_NC\_ECID [s] (number of DRX cycles) | Tmeasure\_Inter\_NC\_ECID [s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) |  (20) | 1.28 (4) |
| 0.64 | ≥12.8 (5) | 1.28 (2) |
| 1.28 | ≥15.36 (6) | 1.28 (1) |
| 2.56 | ≥17.92 (7) | 2.56 (1) |
| 5.12 | ≥23.04 (9) | 5.12 (1) |
| 10.24 | ≥33.28 (13) | 10.24 (1) |
| 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]. |

An inter frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot defined in Annex B.1.5 for a corresponding Band.

For UE not configured with eDRX\_IDLE cycle,the measurement period for inter frequency measurements is Tmeasure\_inter\_NC\_ECID as shown in Table 4.8.7-1. For UE configured with eDRX\_IDLE cycle,the measurement period for inter frequency measurements is Tmeasure\_inter\_NC\_ECID as shown in Table 4.8.7-2.

The UE shall be capable of performing NRSRP and NRSRQ measurement for at least 1 identified inter-frequency cell per inter-frequency for at least 1 inter-frequency carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of Tmeasure\_inter\_NC\_ECID.

The NRSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.22.5. The NRSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.22.7.

#### 4.8.7.1 Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.22.5 and 9.1.22.7.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air 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: *Nrep*x TTIDCCH, where *Nrep* [21] is the maximum number of NPUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x TTIDCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the idle mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in [36] for LPP measurement reporting.

### 4.8.8 Inter-Frequency E-CID NRSRP and NRSRQ Measurements for UE category NB2 for enhanced coverage

UE shall follow the procedure for idle state positioning measurement as defined in [36] section 7.1.3.

The UE shall be able to identify a new detectable inter frequency cell according to the following expression provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID inter-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state:

Tidentify\_inter\_EC= Nfreq\_NB\_ECID•Tidentify\_inter\_EC\_perCC\_ECID

Where Nfreq\_NB\_ECID is the total number of inter frequency carriers UE measuresprovided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID inter-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state.Tidentify\_inter\_EC\_perCC\_ECID is shown in Table 4.8.8-1

For UE not configured with eDRX\_IDLE cycle, Tidentify\_inter\_EC\_perCC\_ECID is as shown in Table 4.8.8-1. For UE configured with eDRX\_IDLE cycle, Tidentify\_inter\_EC\_perCC\_ECID is as shown in Table 4.8.8-1.

Table 4.8.8-1: Requirement to identify a newly detectable inter-frequency cell for E-CID NRSRP/NRSRQ measurement

|  |  |  |  |
| --- | --- | --- | --- |
| SCH Ês/Iot of neighboring cell: Q2 | DRX cycle length [s] | Tdetect,NB\_Inter\_ EC\_perCC\_ECID [s] (number of DRX cycles) | Tmeasure,NB\_Inter\_ EC\_ECID [s] (number of DRX cycles) |
| -15≤ Q2 < -6 | 0.32 | 256 (800) | 1.28 (4) |
| 0.64 | 266 (415) | 1.28 (2) |
| 1.28 | 532 (415)  | 1.28 (1) |
| 2.56 | 532 (208)  | 2.56 (1) |
| 5.12 | 1063 (208)  | 5.12 (1) |
| 10.24 | 1063 (104)  | 10.24 (1) |
| Q2≥-6 | 0.32 | 26 (80) | 1.28 (4) |
| 0.64 | 29 (45) | 1.28 (2) |
| 1.28 | 58 (45) | 1.28 (1) |
| 2.56 | 59 (23) | 2.56 (1) |
| 5.12 | 113 (22) | 5.12 (1) |
| 10.24 | 113 (11) | 10.24 (1) |

Table 4.8.8-2: Requirement to identify a newly detectable inter-frequency cell for E-CID NRSRP/NRSRQ measurement for UE configured with eDRX\_IDLE cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SCH Ês/Iot of neighboring cell: Q2 | eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | Tdetect,NB\_Inter\_ EC\_perCC\_ECID [s] (number of DRX cycles) | Tmeasure,NB\_Inter\_ EC\_ECID [s] (number of DRX cycles) |
| **-15≤ Q2 < -6** | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) |  (406) | 1.28 (4) |
| 0.64 | ≥12.8 (5) | 1.28 (2) |
| 1.28 | ≥15.36 (6) | 1.28 (1) |
| 2.56 | ≥17.92 (7) | 2.56 (1) |
| 5.12 | ≥23.04 (9) | 5.12 (1) |
| 10.24 | ≥33.28 (13) | 10.24 (1) |
| **Q2≥-6** | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) |  (20) | 1.28 (4) |
| 0.64 | ≥12.8 (5) | 1.28 (2) |
| 1.28 | ≥15.36 (6) | 1.28 (1) |
| 2.56 | ≥17.92 (7) | 2.56 (1) |
| 5.12 | ≥23.04 (9) | 5.12 (1) |
| 10.24 | ≥33.28 (13) | 10.24 (1) |
| 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]. |

An inter frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH\_RP and NSCH Ês/Iot defined in Annex B.1.5 for a corresponding Band.

For UE not configured with eDRX\_IDLE cycle, the measurement period for inter frequency measurements is Tmeasure\_inter\_EC\_ECID as shown in Table 4.8.8-1. For UE configured with eDRX\_IDLE cycle, the measurement period for inter frequency measurements is Tmeasure\_inter\_EC\_ECID as shown in Table 4.8.8-2.

The UE shall be capable of performing NRSRP and NRSRQ measurement for at least 1 identified inter-frequency cell per inter-frequency for at least 1 inter-frequency carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of Tmeasure\_inter\_EC\_ECID.

The NRSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.22.5. The NRSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.22.7.

#### 4.8.8.1 Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.22.5 and 9.1.22.7.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air 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: *Nrep*x TTIDCCH, where *Nrep* [21] is the maximum number of NPUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x TTIDCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the idle mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in [36] for LPP measurement reporting.

### <End of Change 2>