3GPP TSG-RAN WG4 Meeting # 111 R4-2410242

Fukuoka , JP, 20 May – 24 May 2024

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | 36.133 | **CR** | 7316 | **rev** | 1 | **Current version:** | 18.5.0 |  |
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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 | **X** | Core Network |  |

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|  |
| ***Title:***  | Big CR to TS 36.133 on Correction of core and performance requirements for NB-IoT/eMTC NTN |
|  |  |
| ***Source to WG:*** | MediaTek inc. |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | LTE\_NBIOT\_eMTC\_NTN\_req |  | ***Date:*** | 20 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | * Formal CR for the draft big CRs R4-2406504 endorsed at RAN4 #110bis
* Capture the following CRs endorsed at RAN4 #111

|  |  |  |
| --- | --- | --- |
| T-doc number | Title | note |
| R4-2407199 | CR on general setup for SIB31 | A.3.28.4 |
| R4-2410246 | (LTE\_NBIoT\_eMTC\_NTN\_req-Perf) CR to TS 36.133: Corrections to IE configurations (Rel 18) | A.13.1.1.1-3 |
| R4-2407200 | CR on test Parameters for UE Transmit Timing Accuracy Tests for NB-IoT over Satellite Access | A.13.4.1.1 |
| R4-2409236 | (LTE\_NBIOT\_eMTC\_NTN\_req-Perf) Correction to PHR reporting requirements for NB-IoT over NTN | 9.1.23A |

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|  |  |
| ***Summary of change:*** | Changes of R4-2405429 (3.5.1A)* Add Band 254 in the groups of bands for satellite access

Changes of R4-2405745 (4.6A.2.1, 4.6A.2.3, 4.7A.2.1.1, 4.7A.2.2.1)* Remove ambiguous sentence

Changes of R4-2406313 (7.22A.2.1)* Update applying time for Timing Advance value, to consider k-Offset in NTN

Changes of R4-2405430 (A.3.28.4)* Correct parameter name and remove parameters that do not exist.

Changes of R4-2407199 (A.3.28.4)* Correct unit of k-Offset / k-Mac
* Update value of k-Offset to align with A.3.28.5

Changes of R4-2410246 (A.13.1.1.1-3)* *s-IntraSearchP-v1360****s*** *corrected to s-IntraSearchP-v1360*

Changes of R4-2407200 (A.13.4.1)* Clarify the value of NPUSCH resource units in A.13.4.1.1, so ensure consistency in the value of NPUSCH resource units across tests A.13.4.1.1, A.13.4.1.2, and A.13.4.1.3.

Changes of R4-2406313 (A.13.4.2)* Update applying time for Timing Advance value, to consider k-Offset in NTN

Changes of R4-2404679 (A.14.5)* Revise the propagation condition to AWGN for the existing tests of intra-frequency event triggered reporting for Cat-M1 UE (A.14.5 in TS36.133)
* Correct typos
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| ***Consequences if not approved:*** | Incorrect RRM requirement.  |
|  |  |
| ***Clauses affected:*** | 3.5.1A, 4.6A.2.1, 4.6A.2.3, 4.7A.2, 7.22A.2.1, 9.1.23AA.3.28.4, A.13.1.1.1-3, A.13.4.1.1, A.13.4.2, A.14.5 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS 36.521-3 |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## <<< START OF CHANGES >>>

### 3.5.1A Groups of bands for satellite access

The grouping of bands for satellite access for NB-IOT is specified in Table 3.5.1A-1.

Table 3.5.1A-1: Band groups for NB-IoT for satellite access

|  |  |
| --- | --- |
| Group | E-UTRA FDD |
|  | Band group notation | Operating bands |
| A | NFDD\_SAB\_A |  |
| B | NFDD\_SAB\_B |  |
| C | NFDD\_SAB\_C |  |
| D | NFDD\_SAB\_D |  |
| E | NFDD\_SAB\_E |  |
| F | NFDD\_SAB\_F |  |
| G | NFDD\_SAB\_G | 253, 254, 255, 256 |
| H | NFDD\_SAB\_H |  |
| I | NFDD\_SAB\_I |  |
| J | NFDD\_SAB\_J |  |
| K | NFDD\_SAB\_K |  |
| L | NFDD\_SAB\_L |  |
| M | NFDD\_SAB\_M |  |
| N | NFDD\_SAB\_N |  |

The grouping of bands for satellite access for category M1 is specified in Table 3.5.1A-2.

Table 3.5.1A-2: Band groups for category M1 for satellite access

|  |  |
| --- | --- |
| Group | E-UTRA FDD |
|  | Band group notation | Operating bands |
| A | FDD-M1\_SAB\_A | 253, 255 |
| B | FDD-M1\_SAB\_B | 254, 256 |
| C | FDD-M1\_SAB\_C |  |
| D | FDD-M1\_SAB\_D |  |
| E | FDD-M1\_SAB\_E |  |
| F | FDD-M1\_SAB\_F |  |
| G | FDD-M1\_SAB\_G |  |
| H | FDD-M1\_SAB\_H |  |
| I | FDD-M1\_SAB\_I |  |
| J | FDD-M1\_SAB\_J |  |
| K | FDD-M1\_SAB\_K |  |
| L | FDD-M1\_SAB\_L |  |
| M | FDD-M1\_SAB\_M |  |
| N | FDD-M1\_SAB\_N |  |

## <<< NEXT CHANGE >>>

#### 4.6A.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.

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 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.

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.

When all the conditions for measuring NRSRP on non-anchor carrier are satisfied, the UE shall filter the NRSRP of the serving NB-IoT cell using at least 2 measurements spaced by at least DRX cycle/2, where the measurements used for the filtering may include measurements on anchor carrier and on non-anchor carrier.

If the UE is not configured with eDRX\_IDLE cycle and has evaluated according to Table 4.6A.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 4.6A.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. Additionally, if the UE is configured with *t-Service* [2], the UE should start measurements of the neighbour cells indicated by the serving cell before *t-Service* is reached according to the requirements provided in clause [4.6A.2.2] and [4.6A.2.5].

If *t-Service* is not provided nor applicable, and 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.

If *t-Service* is provided and applicable of the serving cell then the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 36.304 when any of the following conditions is fulfilled:

- If the UE in RRC\_IDLE 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 within 40 s since time instance T1 provided that *t-Service* > T1 or

- If the UE in RRC\_IDLE 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 within 40 s since the time instance *t-Service*.

- Where, T1 is the time instance in seconds when the UE has determined that the serving cell does not fulfil the cell selection criterion S.

Table 4.6A.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 4.6A.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.

## <<< NEXT CHANGE >>>

#### 4.6A.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.

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 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.*

When all the conditions for measuring NRSRP on non-anchor carrier are satisfied, the UE shall filter the NRSRP of the serving NB-IoT cell using at least 4 measurements, where the measurements used for the filtering may include measurements on anchor carrier and on non-anchor carrier.

If the UE is not configured with eDRX\_IDLE cycle and has evaluated according to Table 4.6A.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 4.6A.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. Additionally, if the UE is configured with *t-Service* [2], the UE should start measurements of the neighbour cells indicated by the serving cell before *t-Service* is reached according to the requirements provided in clause [4.6A.2.4] and [4.6A.2.6].

If *t-Service* is not provided nor applicable, and 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.

If *t-Service* is provided and applicable of the serving cell then the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 36.304 when any of the following conditions is fulfilled:

- If the UE in RRC\_IDLE 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 within 80 s since time instance T1 provided that *t-Service* > T1 or

- If the UE in RRC\_IDLE 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 within 80 s since the time instance *t-Service*.

- Where, T1 is the time instance in seconds when the UE has determined that the serving cell does not fulfil the cell selection criterion S.

Table 4.6A.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 4.6A.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.

## <<< NEXT CHANGE >>>

##### 4.7A.2.1.1 Measurement and evaluation of serving cell for UE category M1 in normal coverage

The requirements in this subclause apply for the UE in the normal coverage area of the serving cell served by a satellite access node. The UE is considered to be in normal coverage area of serving cell according to RSRP, RSRP Ês/Iot, SCH\_RP and SCH Ês/Iot of the serving cell defined in Annex B.1.3 for a corresponding Band.

The UE shall measure the RSRP and RSRQ level of the serving cell and evaluate the cell selection criterion S defined in [1] for the serving cell at least every DRX cycle.

The UE shall filter the RSRP and RSRQ measurements of the 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 4.7A.2.1.1-1 in Nserv consecutive DRX cycles that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving 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 4.7A.2.1.1-2 in Nserv consecutive DRX cycles within a single PTW that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities.

*Editor’s note: FFS on following:*

[If the UE is configured with ‘*t-Service-r17*’ [2] in the serving cell and eDRX\_IDLE, then the UE shall meet the requirements defined for DRX cycle length of [2.56] s in Table 4.7A.2.1.1-1 starting from at least [2] DRX cycles before ‘*t-Service-r17*’.

If the UE is not configured with eDRX\_IDLE cycle and configured with DRX cycle ≥ [1.28] s then the UE shall meet the requirements defined for DRX cycle of [640] ms in Table 4.7A.2.1.1-1 during at least 2 configured DRX cycles immediately after *‘t-ServiceStart-r17’* [2].

If the UE is configured with eDRX\_IDLE cycle then the UE shall meet the requirements defined for eDRX\_IDLE cycle of 5.12 s in Table 4.7A.2.1.1-2 during 2 eDRX\_IDLE cycles immediately after *‘t-ServiceStart-r17’* [2]regardless of the configured eDRX\_IDLE cycle.]

If the UE in RRC\_IDLE 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 [1], where T=10 s if the UE is not configured with eDRX\_IDLE cycle, and T=MAX(10 s, one eDRX\_IDLE cycle) if the UE is configured with eDRX\_IDLE cycle.

When the UE is provided with ‘*t-serviceStart-r17’* and has discontinuous coverage capabilities, then after ‘*t-service-r17’* is reached and the UE is out of coverage, the UE may delay or resume cell measurements/search till when the UE is in coverage. *Editor’s note:* Definition of in coverage is FFS.

Table 4.7A.2.1.1-1: Nserv

|  |  |
| --- | --- |
| DRX cycle length [s] | Nserv [number of DRX cycles] |
| 0.32 | 4 |
| 0.64 | 4 |
| 1.28 | 2 |
| 2.56 | 2 |

Table 4.7A.2.1.1-2: Nservfor UE configured with eDRX\_IDLE cycle

|  |  |  |  |
| --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | Nserv [number of DRX or eDRX cycles Note 3] |
| 5.12 | N/A | N/A | 2 |
| 10.24 ≤ eDRX\_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | 2 |
| 0.64 | ≥1.28 (1) | 2 |
| 1.28 | ≥2.56 (2) | 2 |
| 2.56 | ≥5.12 (4) | 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. |

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.

The UE is allowed to perform RSRP measurements based on RSS signals provided UE is configured with *rss-ConfigCarrierInfo* [2] and following conditions are met:

- Serving cell RSS are available within the paging MPDCCH narrowband for Nserv successive DRX cycles and the last subframe of the RSS occasion is in the window [n-5, n-1] where n is the first subframe of paging MPDCCH narrowband, and

- RSS power offset (PRSS) with respect to CRS as defined in *RSS-Config* [2], where PRSS ≥ 0 dB, and

- UE is not configured with eDRX\_IDLE cycle, and DRX cycle length is 0.32s or 0.64s.

- Nserv defined in Table 4.7A.2.1.1-1 applies if serving cell is measured based on RSS.

Table 4.7A.2.1.1-1: Nserv

|  |  |
| --- | --- |
| DRX cycle length [s] | Nserv [number of DRX cycles] |
| 0.32 | 3 |
| 0.64 | 3 |
| 1.28 | N/A |
| 2.56 | N/A |

If UE performs RSRP measurement based on RSS for serving cell, it is not expected to perform RSRP measurement based on CRS on that serving cell.

## <<< NEXT CHANGE >>>

##### 4.7A.2.2.1 Measurement and evaluation of serving cell for UE category M1 in enhanced coverage

The requirements in this subclause apply if UE is in the enhanced coverage area of the serving cell served by a satellite access node. The UE is considered to be in enhanced coverage area of serving cell according to RSRP, RSRP Ês/Iot, SCH\_RP and SCH Ês/Iot of the serving cell defined in Annex B.1.3 for a corresponding Band.

The UE shall measure the RSRP and RSRQ level of the serving cell and evaluate the cell selection criterion S defined in [1] for the serving cell at least every DRX cycle.

The UE is allowed to perform RSRP measurements based on RSS signals provided UE is configured with *rss-ConfigCarrierInfo* [2] and following conditions are met:

- Serving cell RSS are available within the paging MPDCCH narrowband for Nserv successive DRX cycles and the last subframe of the RSS occasion is in the window [n-5, n-1] where n is the first subframe of paging MPDCCH narrowband, and

- RSS power offset (PRSS)with respect to CRS as defined in *RSS-Config* [2], where PRSS ≥ 0 dB, and

- UE is not configured with eDRX\_IDLE cycle, and DRX cycle length is 0.32s or 0.64s.

If UE performs RSRP measurement based on RSS for serving cell, it is not expected to perform RSRP measurement based on CRS on that serving cell.

The UE shall filter the RSRP and RSRQ measurements of the serving 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 4.7A.2.2.1-1 in Nserv\_EC consecutive DRX cycles that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving 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 4.7A.2.2.1-2 in Nserv\_EC consecutive DRX cycles within a single PTW that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities.

*Editor’s note: FFS on following:*

[If the UE is configured with ‘*t-Service*’ [2] in the serving cell and eDRX\_IDLE, then the UE shall meet the requirements defined for DRX cycle length of [2.56] s in Table 4.7A.2.1.1-1 starting from at least [4] DRX cycles before ‘*t-Service-r17*’.

If the UE is not configured with eDRX\_IDLE cycle and configured with DRX cycle ≥ [1.28] s then the UE shall meet the requirements defined for DRX cycle of [320] ms in Table 4.7A.2.2.1-1during at least 2 configured DRX cycles immediately after *‘t-ServiceStart-r17’* [2].

If the UE is configured with eDRX\_IDLE cycle then the UE shall meet the requirements defined for eDRX\_IDLE cycle of 5.12 s in Table 4.7A.2.2.1-2during 2 eDRX\_IDLE cycles immediately after *‘t-ServiceStart-r17’* [2]regardless of the configured eDRX\_IDLE cycle.]

If the UE in RRC\_IDLE 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 [1], where T=20 s if the UE is not configured with eDRX\_IDLE cycle, and T=MAX(20 s, one eDRX\_IDLE cycle) if the UE is configured with eDRX\_IDLE cycle.

Table 4.7A.2.2.1-1: Nserv\_EC

|  |  |
| --- | --- |
| DRX cycle length [s] | Nserv\_EC [number of DRX cycles] |
| 0.32 | 8 |
| 0.64 | 8 |
| 1.28 | 4 |
| 2.56 | 4 |

Table 4.7A.2.2.1-2: Nserv\_ECfor UE configured with eDRX\_IDLE cycle

|  |  |  |  |
| --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | Nserv\_EC [number of DRX or eDRX cycles Note 3] |
| 5.12 | N/A | N/A | 4 |
| 10.24 ≤ eDRX\_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | 4 |
| 0.64 | ≥2.56 (2) | 4 |
| 1.28 | ≥5.12 (4) | 4 |
| 2.56 | ≥10.24(8) | 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 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. |

Nserv\_EC defined in Table 4.7A.2.2.1-3 applies if serving cell is measured based on RSS.

Table 4.7A.2.2.1-3: Nserv\_EC

|  |  |
| --- | --- |
| DRX cycle length [s] | Nserv [number of DRX cycles] |
| 0.32 | 5 |
| 0.64 | 5 |
| 1.28 | N/A |
| 2.56 | N/A |

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.

## <<< NEXT CHANGE >>>

#### 7.22A.2.1 Timing Advance adjustment delay

UE shall adjust the timing of its uplink transmission timing at sub-frame *n*+12+ *k-Offset-r17+*1 for a timing advance command received in sub-frame *n*, where *k-Offset-r17* is specified in [2]. In case repetitions are used on the downlink, sub-frame *n* refers to the last subframe in the repetition period in which the message containing the MAC control information was received. The UE shall not apply a TA command during an uplink repetition period.

## <<< NEXT CHANGE >>>

### 9.1.23A Power Headroom for UE Category NB1 for Satellite Access

The requirements in this clause shall apply for power headroom for UE Category NB1 as defined in [31].

The power headroom provides the serving eNB with information about the differences between the UE configured maximum output power (PCMAX,) defined in TS 36.102 [60] and the estimated power for UL-NSCH transmission of the serving cell [3].

Table 9.1.23A-1: The applicability of power headroom report mapping requirements for different power class UE

|  |  |
| --- | --- |
| **Power class** | **Power headroom report mapping** |
| PC3 and PC5 | As defined in section 9.1.23A.3 |
| PC6 | As defined in section 9.1.23A.4 |

#### 9.1.23A.1 Period

The reported power headroom shall be estimated over 1 slot of NPUSCH transmissions.

#### 9.1.23A.2 Reporting Delay

The power headroom reporting delay is defined as the time between the beginning of the power headroom reference period and the time when the UE starts transmitting the power headroom over the radio interface. The reporting delay of the power headroom shall be 0 ms, which is applicable for all configured triggering mechanisms for power headroom reporting.

#### 9.1.23A.3 Report Mapping for UE Category NB1 for Satellite Access

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
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|  |  |
|  |  |
|  |  |
|  |  |

For UE category NB1, the report mapping defined in clause 9.1.23.3 applies.

##### 9.1.23A.3.1 Void

##### 9.1.23A.3.2 Void

#### 9.1.23A.4 Report Mapping for UE Category NB1 for UE Power Class 6 for Satellite Access

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

For UE category NB1 in for UE power class 6 [5], the report mapping defined in clause 9.1.23.4 applies.

## <<< NEXT CHANGE >>>

### A.3.28.4 General setup for SIB31/SIB-31-NB

The general parameters for SIB31/SIB31-NB setup is specified in Table A.3.28.4-1.

Table A.3.28.4-1: General setup for SIB31/SIB31-NB

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Test 1 |
| Interval between adjacent epoch time | s | LEO: 2.56GEO, GSO: 10.24 |
| ntn-UlSyncValidityDuration | s | LEO: 5sGEO, GSO: 900s |
| k-Offset-r17 | ms | LEO: 14GEO, GSO: 258 |
| kmac  | ms | Not configured |
| ta-Common |  | 0 |
| ta-CommonDrift |  | 0 |
| ta-CommonDriftVariant |  | 0 |
|  |  |  |
|  |  |  |
| ephemerisInfo |  | According to Annex B.8 |
| ta-Report |  | Not configured |

## <<< NEXT CHANGE >>>

### A.13.1.1 Cell re-selection for satellite access

#### A.13.1.1.1 HD – FDD Intra frequency case for UE Category NB1 Standalone mode in normal coverage

##### A.13.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6A.2.2.

The test scenario comprises of one NB-IoT carrier with 2 nCells of different physical cell ID, as given in tables A.13.1.1.1.1-1, A.13.1.1.1.1-2 and A.13.1.1.1.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.13.1.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GEO, HD-FDD duplex mode |

Table A.13.1.1.1.1-2: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NB-IOT operational mode |  | Standalone |  |
| Satellite information | Config 1 |  | GEO |  |
| Initial condition | Active cell  |  | nCell1 |  |
| Neighbour cells |  | nCell2 |  |
| T2 end condition | Active cell  |  | nCell2 |  |
| Neighbour cells |  | nCell1 |  |
| Final condition | Visited cell  |  | nCell1 |  |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| *s-IntraSearchP-v1360* |  | 63 (126 dB) | to trigger intra-frequency measurement in this test |
| DRX cycle length | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | s | 60 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | s | 15 | T3 is defined so that cell re-selection time is taken into account. |

Table A.13.1.1.1.1-3: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **nCell 1** | **nCell 2** |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| BWchannel | kHz | 200 | 200 |
| OCNG Pattern as defined in A.3 | **-** | NOP.3 FDD | NOP.3 FDD |
| NPBCH\_RA | dB | 0 | 0 |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1  | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | NRSRP | NRSRP |
|  | dBm/15 kHz | -98 |
|  | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
|  Note2 | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| NRSRP Note2 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition  |  | AWGN | AWGN |
| Antenna Configuration |  | 1x1 | 1x1 |
| Timing offset to nCell 1 | ms | - | 3 |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

##### A.13.1.1.1.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 59.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 14.82 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB\_Intra\_NB-IoT-NC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB\_intra\_NB-IoT-NC + TSI,

Where:

Tdetect,NB\_Intra\_NB-IoT-NC See Table 4.6A.2.2-1 in clause 4.6A.2.2

Tevaluate, NB\_intra\_NB-IoT-NC See Table 4.6A.2.2-1 in clause 4.6A.2.2

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 59.32 s, allow 60 s for the cell re-selection delay to a newly detectable cell and 14.82 s, allow 15s for the cell re-selection delay to an already detected cell in the test case.

#### A.13.1.1.2 HD – FDD Intra frequency case for UE Category NB1 Standalone mode in normal coverage with serving cell RRM measurement relaxation

##### A.13.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6A.2.1A when UE is configured to monitor WUS according to Table A.13.1.1.2.1-2 and under the serving cell RRM measurement relaxation according to the subclause 4.6A.2.1A and under the intra-frequency neighbor cell measurement relaxation according to the subclause 4.6A.2.2.

The test scenario comprises of one NB-IoT carrier with 2 nCells of different physical cell ID, as given in tables A.13.1.1.2.1-1, A.13.1.1.2.1-2 and A.13.1.1.2.1-3. The test consists of two successive time periods, with time duration of T1 and T2, respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.13.1.1.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GEO, HD-FDD duplex mode |

Table A.13.1.1.2.1-2: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NB-IOT operational mode |  | Standalone |  |
| Satellite information | Config 1 |  | GEO |  |
| Initial condition | Active cell  |  | nCell1 |  |
| Neighbour cells |  | nCell2 |  |
| T2 end condition | Active cell  |  | nCell2 |  |
| Neighbour cells |  | nCell1 |  |
| Final condition | Visited cell  |  | nCell1 |  |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| *s-IntraSearchP-v1360* |  | 63 (126 dB) | to trigger intra-frequency measurement in this test |
| SSearchDeltaP | dB | 6 | Threshold for relaxed monitoring criterion as specified in 5.2.4.12.1 in [1] |
| Rmax |  | 128 |  |
| maxDurationFactor |  | one4th | WUS config. Wmax = 32 (=1/4\*Rmax) |
| numPOs |  | n1 | WUS config. Single PO mapped to each WUS occasion |
| timeOffsetDRX |  | ms40 | WUS config. Gap between the end of WUS duration to the associated PO |
| numDRX-CycleRelaxed |  | 4 | Serving cell RRM measurement is relaxed by  |
| DRX cycle length | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | s | >30 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | s | 70 | T2 is defined so that cell re-selection time is taken into account.  |

Table A.13.1.1.2.1-3: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **nCell 1** | **nCell 2** |
| **T1** | **T2** | **T1** | **T2** |
| BWchannel | kHz | 200 | 200 |
| OCNG Pattern as defined in A.3 | **-** | NOP.3 FDD | NOP.3 FDD |
| NPBCH\_RA | dB | 0 | 0 |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1  | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | NRSRP | NRSRP |
|  | dBm/15 kHz | -98 |
|  | dB | 17 | 7 | -infinity | 11 |
|  Note2 | dB | 17 | -4.33 | -infinity | 3.21 |
| NRSRP Note2 | dBm/15 kHz | -81 | -91 | -infinity | -87 |
| Treselection | s | 0 | 0 | 0 | 0 |
| Propagation Condition  |  | AWGN | AWGN |
| Antenna Configuration |  | 1x1 | 1x1 |
| Timing offset to nCell 1 | ms | - | 3 |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

A.13.1.1.2.2 Test Requirements

Before the beginning of T2, UE is under relaxed monitoring where the serving cell measurement is performed every 5.12 s and the infra-frequency measurement for the neighbor cells is relaxed according to subclause 5.2.4.12.0 in TS 36.304 [1].

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 69.56 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tevaluate, serv\_NB-NC + Tdetect,NB\_Intra\_NB-IoT-NC + TSI.

Where:

Tdetect,NB\_Intra\_NB-IoT-NC See Table 4.6A.2.2-1 in clause 4.6A.2.2, based on the configured DRX cycle

Tevaluate, serv\_NB-NC See Table 4.6A.2.2-1 in clause 4.6A.2.2, based on the effective DRX cycle after relaxation; 10.24 s is assumed in this test case.

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 69.56 s, allow 70 s for the cell re-selection delay to a newly detectable in the test case.

#### A.13.1.1.3 HD – FDD Intra frequency case for UE Category NB1 Standalone mode in normal coverage with UE specific DRX

##### A.13.1.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6A.2.2.

The test scenario comprises of one NB-IoT carrier with 2 nCells of different physical cell ID, as given in tables A.13.1.1.3.1-1, A.13.1.1.3.1-2 and A.13.1.1.3.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2. In Test 1, UE supports the UE specific DRX cycle of 0.32 s and the UE shall be configured with DRX cycle of 0.32 s prior to the start of the test. In Test 2, UE supports the UE specific DRX cycle of 0.64 s and the UE shall be configured with DRX cycle of 0.64 s prior to the start of the test.

The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.13.1.1.3.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GEO, HD-FDD duplex mode |

Table A.13.1.1.3.1-2: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| **Test 1** | **Test 2** |
| NB-IOT operational mode |  | Standalone |  |
| Satellite information | Config 1 |  | GEO |  |
| Initial condition | Active cell  |  | nCell1 |  |
| Neighbour cells |  | nCell2 |  |
| T2 end condition | Active cell  |  | nCell2 |  |
| Neighbour cells |  | nCell1 |  |
| Final condition | Visited cell  |  | nCell1 |  |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| *s-IntraSearchP-v1360* |  | 63 (126 dB) | to trigger intra-frequency measurement in this test |
| DRX cycle length | s | 0.32 | 0.64 | The value shall be used for all cells in the test. |
| T1 | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | s | 35 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | s | 14 | T3 is defined so that cell re-selection time is taken into account. |

**Table A.13.1.1.3.1-3: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **nCell 1** | **nCell 2** |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| BWchannel | kHz | 180 | 180 |
| OCNG Pattern as defined in A.3 | **-** | NOP.3 FDD | NOP.3 FDD |
| NPBCH\_RA | dB | 0 | 0 |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote 1 | dB |
| NOCNG\_RBNote 1  | dB |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | NRSRP | NRSRP |
|  | dBm/15 kHz | -98 |
|  | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
|  Note2 | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| NRSRP Note2 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition  |  | AWGN | AWGN |
| Antenna Configuration |  | 1x1 | 1x1 |
| Timing offset to nCell 1 | ms | - | 3 |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

##### A.13.1.1.3.2 Test Requirements

In each test, the cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34.32 s in test 1 and test 2.

In each test, the cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 13.44 s in test 1 and test 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB\_Intra\_NC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB\_intra\_NC + TSI,

Where:

Tdetect,NB\_Intra\_NC See Table 4.6A.2.2-1 in clause 4.6A.2.2

Tevaluate, NB\_intra\_NC See Table 4.6A.2.2-1 in clause 4.6A.2.2

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 34.32 s, allow 35 s for the cell re-selection delay to a newly detectable cell and 13.44 s, allow 14s for the cell re-selection delay to an already detected cell in the test case.

## <<< NEXT CHANGE >>>

#### A.13.4.1.1 E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Category NB1 UE Standalone mode under normal coverage for Satellite Access

##### A.13.4.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the Category NB1 UE under normal coverage is capable of following the frame timing change of the connected eNodeB and that the UE initial transmits timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.20A.

For this test a single NB-IoT cell is used. Test parameters are given in Table A.13.4.1.1.1-1, Table A.13.4.1.1.1-2 and A.13.4.1.1.1-3. The transmit timing is verified by the UE transmitting NPUSCH.

Table A.13.4.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. |

Table A.13.4.1.1.1-2: General Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under normal coverage for Satellite Access

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| **Test 1** |
| NB-IoT Operation mode |  | Standalone |
| DRX |  | OFF |
| Satellite information | Config 1 |  | SSC.1 |
| Config 2 |  | SSC.2 |
| NPDCCH repetition level |  | 1 |
| npdcch-StartSF-USS Note 1 |  | v8 |
| npdcch-NumRepetitions-r13 Note 1 |  | r1 |
| NPUSCH resource units |  | 1 |
| NPUSCH repetition level |  | 1 |
| Note 1: For further information see clause 6.7.3.2 in TS 36.331 [2]. |

## <<< NEXT CHANGE >>>

### A.13.4.2 UE timing advance for satellite access

#### A.13.4.2.1 HD-FDD UE Timing Advance Adjustment Accuracy Test for UE Category NB1 in Standalone Mode under Normal Coverage for Satellite Access

##### A.13.4.2.1.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN Timing Advance adjustment accuracy requirements for UE category NB1 in normal coverage, defined in clause 7.22A.2.2, in an AWGN model.

The test parameters are given in tables A.13.4.2.1.1-1 A.13.4.2.1.1-2 and A.13.4.2.1.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and the UE is scheduled in every uplink subframe to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 16.1.2 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.13.4.2.1.1-3. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the NPUSCH sent from the UE.

As specified in Clause 7.22A.2.1, the UE adjusts its uplink timing at sub-frame *n*+12+ *k-Offset-r17+*1 for a timing advance command received in sub-frame *n*, where sub-frame *n* refers to the last subframe in the repetition period in which the MAC control element containing timing advance command was received and *k-Offset-r17* is specified in [2]. In addition, the UE shall not apply a TA command during an uplink repetition period. The timing advance adjustment accuracy is verified via the uplink transmission of NPUSCH carrying ACK/NACK response to the NPDSCH carrying TA command. *k0* in ACK/NACK resource filed in DCI is set as 13.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

Table A.13.4.2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. |

Table A.13.4.2.1.1-2: General Test Parameters for E-UTRAN Timing Advance Accuracy Test for UE Category NB1 in Standalone Mode under Normal Coverage for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NB-IoT operational mode |  | Standalone |  |
| CP Length |  | Normal |  |
| Satellite information | Config 1 |  | SSC.1 |  |
| Config 2 |  | SSC.2 |  |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA* = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *NTA* = 128 |
| Number of repetitons | NPDCCH |  | 128 |  |
| NPDSCH |  | 128 |  |
| NPUSCH |  | 32 |  |
| DRX |  | OFF |  |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

**Table A.13.4.2.1.1-3: Cell specific Test Parameters for E-UTRAN Timing Advance Accuracy Test for UE Category NB1 in Standalone Mode under Normal Coverage for Satellite Access**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | KHz | 200 |
| NPDSCH parameters:DL Reference Measurement Channel defined in A.3.1.5.3 |  | R.18 HD-FDD |
| NPDCCH parameters:DL Reference Measurement Channel defined in A.3.1.6.3 |  | R.30 HD-FDD |
| NOCNG Patterns defined in A.3.2.3.3 |  | NOP.3 FDD |
| NPBCH\_RA | dB | 0 |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote1 | dB |
| NOCNG\_RBNote1  | dB |
| Timing Advance Command (*TA*) |  | 31 | 39 |
|  | dB |  4 |
|  | dBm/15 KHz | -88 |
|  | dB |  4 |
| IoNote2 | dBm/ 180 KHz | -71.7 |
| Antenna Configuration |  | 1x1 |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter. |

##### A.13.4.2.1.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at subframe *n*+12+ *k-Offset-r17+*1, where subframe *n* is the last subframe in the repetition period of NPDSCH in which the timing advance command is received by the UE.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.22A.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

#### A.13.4.2.2 HD-FDD UE Timing Advance Adjustment Accuracy Test for UE Category NB1 in Standalone Mode under Enhance Coverage for Satellite Access

##### A.13.4.2.2.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN Timing Advance adjustment accuracy requirements for UE category NB1 in enhanced coverage, defined in clause 7.22A.2.2, in an AWGN model.

The test parameters are given in tables A.13.4.2.2.1-1, A.13.4.2.2.1-2and A.13.4.2.2.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and the UE is scheduled in every uplink subframe to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 16.1.2 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.13.4.2.2.1-3. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the NPUSCH sent from the UE.

As specified in Clause 7.22A.2.1, the UE adjusts its uplink timing at sub-frame *n*+12+ *k-Offset-r17+*1 for a timing advance command received in sub-frame *n*, where sub-frame *n* refers to the last subframe in the repetition period in which the MAC control element containing timing advance command was received and *k-Offset-r17* is specified in [2]. In addition, the UE shall not apply a TA command during an uplink repetition period. The timing advance adjustment accuracy is verified via the uplink transmission of NPUSCH carrying ACK/NACK response to the NPDSCH carrying TA command. *k0* in ACK/NACK resource filed in DCI is set as 13.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

Table A.13.4.2.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. |

Table A.13.4.2.2.1-2: General Test Parameters for E-UTRAN Timing Advance Accuracy Test for UE Category NB1 in Standalone Mode under Enhanced Coverage for Satellite Access

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NB-IoT operational mode |  | Standalone |  |
| CP Length |  | Normal |  |
| Satellite information | Config 1 |  | SSC.1 |  |
| Config 2 |  | SSC.2 |  |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA* = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *NTA* = 128 |
| Number of repetitons | NPDCCH |  | 128 |  |
| NPDSCH |  | 128 |  |
| NPUSCH |  | 32 |  |
| DRX |  | OFF |  |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

Table A.13.4.2.2.1-3: Cell specific Test Parameters for E-UTRAN Timing Advance Accuracy Test for UE Category NB1 in Standalone Mode under Enhanced Coverage for Satellite Access

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | KHz | 200 |
| NPDSCH parameters:DL Reference Measurement Channel defined in A.3.1.5.3 |  | R.18 HD-FDD |
| NPDCCH parameters:DL Reference Measurement Channel defined in A.3.1.6.3 |  | R.30 HD-FDD |
| NOCNG Patterns defined in A.3.2.3.3 |  | NOP.3 FDD |
| NPBCH\_RA | dB | 0 |
| NPBCH\_RB | dB |
| NPSS\_RA | dB |
| NSSS\_RA | dB |
| NPDCCH\_RA | dB |
| NPDCCH\_RB | dB |
| NPDSCH\_RA | dB |
| NPDSCH\_RB | dB |
| NOCNG\_RANote1 | dB |
| NOCNG\_RBNote1  | dB |
| Timing Advance Command (*TA*) |  | 31 | 39 |
|  | dB | -12 |
|  | dBm/15 KHz | -88 |
|  | dB | -12 |
| IoNote2 | dBm/ 180 KHz | -76.9 |
| Antenna Configuration |  | 1x1 |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter. |

##### A.13.4.2.2.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at subframe *n*+12+ *k-Offset-r17+*1, where subframe *n* is the last subframe in the repetition period of NPDSCH in which the timing advance command is received by the UE.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.22A.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## <<< NEXT CHANGE >>>

## A.14.5 UE measurement procedures in RRC\_CONNECTED state for satellite access

The reference channels in this clause assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

### A.14.5.1 Intra-frequency measurements for satellite access

#### A.14.5.1.1 E-UTRAN FDD-FDD intra-frequency event triggered reporting under AWGN conditions in asynchronous cells for Cat-M1 UE in CEModeA

##### A.14.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements for Cat-M1 UE in clause 8.13A.2.1.1.1.

The test parameters are given in Table A.14.5.1.1.1-1 and A.14.5.1.1.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

Table A.14.5.1.1.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under AWGN conditions in asynchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number |  | 1 | One radio channel is used. |
| Satellite information |  | GSO |  |
| Active cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 | Cell to be identified. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| A3 | Offset | dB | -6 |  |
| Hysteresis | dB | 0 |  |
| Time To Trigger | S | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| Gap pattern ID |  | 1 |  |
| T1 | S | 5 |  |
| T2 | S | 5 |  |

Table A.14.5.1.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under AWGN conditions in asynchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | MHz | 1.4 |
| PDSCH parameters:DL Reference Measurement Channel |  | R.48 FDD | - |
| MPDCCH parameters:DL Reference Measurement Channel |  | R.46 FDD | R.46 FDD |
| OCNG Patterns  |  | OP.21 FDD | OP.6 FDD |
| PBCH\_RA | dB | -3 | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1  | dB |
|  Note 2 | dBm/15 KHz | -98 |
|  | dB | 4 | 4 | -Infinity | 4 |
|  Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH\_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified inCell 1 columns  |
| Propagation Condition  |  | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | 1x1 Low |
| Timing offset to Cell 1 | ms | - | 3 |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.Note 3: Es/Iot, RSRP, SCH\_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |

##### A.14.5.1.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 2.88s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.14.5.1.2 E-UTRAN FDD-FDD intra-frequency event triggered reporting under AWGN conditions in synchronous cells for Cat-M1 UE in CEModeA in DRX

##### A.14.5.1.2.1 Test Purpose and Environment

The purpose of the two tests is to verify that the Cat-M1 UE makes correct reporting of an event in DRX. The tests will partly verify the FDD intra-frequency cell search in DRX requirements in clause 8.13A.2.1.1.2.

The test parameters are given in Tables A.14.5.1.2.1-1, A.14.5.1.2.1-2, A.14.5.1.2.1-3 and A.14.5.1.2.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time alignment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

Table A.14.5.1.2.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under AWGN conditions in synchronous cells for Cat-M1 UE when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| **Test1** | **Test2** |
| E-UTRA RF Channel Number |  | 1 | 1 | One radio channel is used. |
| Satellite information |  | GSO | GSO |  |
| Active cell |  | Cell 1 | Cell 1 |  |
| Neighbour cell |  | Cell 2 | Cell 2 | Cell to be identified. |
| CP length |  | Normal | Normal |  |
| DRX |  | ON | ON | DRX related parameters are defined in Table A.14.5.1.2.1-3 |
| A3 | Offset | dB | -6 | -6 |  |
| Hysteresis | dB | 0 | 0 |  |
| Time To Trigger | s | 0 | 0 |  |
| Filter coefficient |  | 0 | 0 | L3 filtering is not used |
| Gap pattern ID |  | 0 | 0 |  |
| T1 | s | 5 | 5 |  |
| T2 | s | 5 | 30 |  |

**Table A.14.5.1.2.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under AWGN conditions in synchronous cells for Cat-M1 UE when DRX is used**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | MHz | 1.4 |
| PDSCH parameters:DL Reference Measurement Channel |  | R.48 FDD | - |
| MPDCCH parameters:DL Reference Measurement Channel |  | R.46 FDD | R.46 FDD |
| OCNG Patterns  |  | OP.21 FDD | OP.6 FDD |
| PBCH\_RA | dB | -3 | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1  | dB |
|  Note 2 | dBm/15 KHz | -98 |
|  | dB | 4 | 4 | -Infinity | 4 |
|  Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH\_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified inCell 1 columns  |
| Propagation Condition  |  | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | 1x1 Low |
| Timing offset to Cell 1 | μs | - | 3 |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.Note 3: Es/Iot, RSRP, SCH\_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |

Table A.14.5.1.2.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under AWGN conditions in synchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Test1** | **Test2** | **Comment** |
| **Value** | **Value** |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 |
| drx-RetransmissionTimer | psf1 | psf1 |
| longDRX-CycleStartOffset | sf40 | sf1280 |
| shortDRX | disable | disable |

Table A.14.5.1.2.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under AWGN conditions in synchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Test1** | **Test2** | **Comment** |
| **Value** | **Value** |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

##### A.14.5.1.2.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1.44 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 25600 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

#### A.14.5.1.3 E-UTRAN HD-FDD intra-frequency event triggered reporting under AWGN conditions in asynchronous cells for Cat-M1 UE in CEModeA

##### A.14.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the HD-FDD intra-frequency cell search requirements in clause 8.13A.2.1.2.1.

The test parameters are given in Table A.14.5.1.3.1-1 and A.14.5.1.3.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

Table A.14.5.1.3.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under AWGN conditions in asynchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number |  | 1 | One radio channel is used for this test |
| Satellite information |  | GSO |  |
| Active Cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 | Cell to be identified |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| A3 | Offset | dB | -6 |  |
| Hysteresis | dB | 0 |  |
| Time To Trigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| Gap pattern ID |  | 1 |  |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

Table A.14.5.1.3.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under AWGN conditions in asynchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 |
| BW**channel** | MHz | 1.4 |
| PDSCH parameters:DL Reference Measurement Channel |  | R.49 HD-FDD | - |
| MPDCCH parameters:DL Reference Measurement Channel |  | R.47 HD-FDD | R.47 HD-FDD |
| OCNG Patterns |  | OP.21 FDD | OP.6 FDD |
| PBCH\_RA | dB | -3 | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1  | dB |
| NocNote 2 | dBm/15 kHz | -98 |
| Ês/Noc | dB | 4 | 4 | -infinity | 4 |
| Ês/Iot Note 3 | dB | 4 | -1.46 | -infinity | -1.46 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -infinity | -94 |
| SCH\_RP Note 3 | dBm/15 kHz | -94 | -94 | -infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified inCell 1 columns  |
| Propagation Condition |  | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | 1x1 Low |
| Timing offset to Cell 1 | ms | - | 3 |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.Note 3: Es/Iot, RSRP, SCH\_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |

##### A.14.5.1.3.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 2.88s from the beginning of time period T2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the tests may be up to 2×TTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.14.5.1.4 E-UTRAN HD-FDD intra-frequency event triggered reporting under AWGN conditions in synchronous cells for Cat-M1 UE in CEModeA in DRX

##### A.14.5.1.4.1 Test Purpose and Environment

The purpose of the two tests is to verify that the Cat-M1 UE makes correct reporting of an event in DRX. The tests will partly verify the HD-FDD intra-frequency cell search in DRX requirements in clause 8.13A.2.1.2.2.

The test parameters are given in Tables A.14.5.1.4.1-1, A.14.5.1.4.1-2, A.14.5.1.4.1-3 and A.14.5.1.4.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time alignment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

Table A.14.5.1.4.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under AWGN conditions in synchronous cells for Cat-M1 UE in CEModeA when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| **Test1** | **Test2** |  |
| E-UTRA RF Channel Number |  | 1 | 1 | One radio channel is used for this test |
| Satellite information |  | GSO | GSO |  |
| Active cell |  | Cell 1 | Cell1 |  |
| Neighbour cell |  | Cell 2 | Cell2 | Cell to be identified. |
| CP length |  | Normal | Normal |  |
| DRX |  | ON | ON | DRX related parameters are defined in Table A.14.5.1.4.1-3 |
| A3 | Offset | dB | -6 | -6 |  |
| Hysteresis | dB | 0 | 0 |  |
| Time To Trigger | s | 0 | 0 |  |
| Filter coefficient |  | 0 | 0 | L3 filtering is not used |
| Gap pattern ID |  | 0 | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| T1 | s | 5 | 5 |  |
| T2 | s | 5 | 35 |  |

Table A.14.5.1.4.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under AWGN conditions in synchronous cells for Cat-M1 UE in CEModeA when DRX is used

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | **Cell 2** |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 |
| BWchannel | MHz | 1.4 |
| PDSCH parameters:DL Reference Measurement Channel |  | R.49 HD-FDD | - |
| MPDCCH parameters:DL Reference Measurement Channel |  | R.47 HD-FDD | R.47 HD-FDD |
| OCNG Patterns  |  | OP.21 FDD | OP.6 FDD |
| PBCH\_RA | dB | -3 | -3 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1  | dB |
|  Note 2 | dBm/15 KHz | -98 |
|  | dB | 4 | 4 | -Infinity | 4 |
|  Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH\_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified inCell 1 columns  |
| Propagation Condition  |  | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | 1x1 Low |
| Timing offset to Cell 1 | μs | - | 3 |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.Note 3: Es/Iot, RSRP, SCH\_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |

Table A.14.5.1.4.1-3: DRX-Configuration for E-UTRAN HD-FDD intra-frequency event triggered reporting in DRX under AWGN conditions in synchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Test1** | **Test2** | **Comment** |
| **Value** | **Value** |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 |
| drx-RetransmissionTimer | psf1 | psf1 |
| longDRX-CycleStartOffset | sf40 | sf1280 |
| shortDRX | disable | disable |

Table A.14.5.1.4.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD intra-frequency event triggered reporting in DRX under AWGN conditions in synchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Test1** | **Test2** | **Comment** |
| **Value** | **Value** |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | 30 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

##### A.14.5.1.4.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1.44 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 32 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## <<< END OF CHANGES >>>