**3GPP TSG- Meeting #R4-2410265**

**, , 15th - 19th April, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | DraftCR on 36.133 Test Cases for time-based triggering of interfrequency measurements for Cat-M1 devices | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IOT\_NTN\_ENH | | | | |  | ***Date:*** | | | 2024-04-22 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | R18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduce new test cases for inter-frequency measurement reports with time time based triggers | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introducing the new test cases | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Test cases will be missing | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.14.5.2.1, A.14.5.2.2, A.14.5.2.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | **R4-2408519** | | | | | | | | |

Start of Change

#### A.14.5.2.1 E-UTRAN FD-FDD Inter-frequency event triggered reporting in asynchronous cells for UE category M1 in CEModeA when DRX is used with time-based triggering

##### A.14.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting when *t-serviceStartNeigh* is configured. This test will partly verify the FDD inter-frequency cell search requirements for Cat-M1 UE in clause 8.13A.2.1.1.1.

The test parameters are given in Table A.14.5.2.1.1-1 and A.14.5.2.1.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with EventA3 is used. The test consists of four successive time periods, with time duration of T1, T2, T3 and T4 respectively.

During time duration T1, the UE shall not have any timing information of cell 2. The assistance information provided for cell 2 indicates that *t-serviceStartNeigh* happens at the beginning of time T4.

At the beginning of T2 the transmission power of cell 2, configured in a different satellite, is increased to the same level as for cell 1. As the UE has not reached *t-serviceStartNeigh* for this frequency layer, UE shall skip the measurement gaps in this interval and no report is made.

At the beginning of T3 the transmission power of cell 2 is turned down, such that it become an unknown cell for the UE after 5 seconds.

At the beginning of T4, the transmission power of cell 2 increased to the same level as for cell 1. This shall result in reporting of event A3.

Table A.14.5.2.1.1-1: General test parameters for E-UTRAN FD-FDD Inter-frequency event triggered reporting in asynchronous cells for UE category M1 in CEModeA when DRX is used with time-based triggering

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number | |  | 1,2 |  |
| Satellite Orbit Configuration | |  | NGSO |  |
| Active cell | |  | Cell 1 |  |
| Neighbour cell | |  | Cell 2 | Cell to be identified. |
| CP length | |  | Normal |  |
| DRX | |  | ON |  |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| 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 | 8 |  |
| T3 | | s | >5 |  |
| T4 | | s | 8 |  |

Table A.14.5.2.1.1-2: Cell specific test parameters for E-UTRAN FD-FDD Inter-frequency event triggered reporting in asynchronous cells for UE category M1 in CEModeA when DRX is used with time-based triggering

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | **Cell 2** | | | |
| **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| E-UTRA RF Channel Number |  | 1 | | | | 2 | | | |
| Satellite Assistance Information (Clause A.3.28.5) |  | SSC.2 | | | | NSC.4 | | | |
| BWchannel | MHz | 1.4 | | | | | | | |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.48 FDD | | | | R.48 FDD | | | |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R.46 FDD | | | | R.46 FDD | | | |
| OCNG Patterns |  | OP.7 FDD | | | | OP.7 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 | 4 | 4 | -Infinity | 4 | -Infinity | 4 |
| Note 3 | dB | 4 | -1.46 | 4 | -1.46 | -Infinity | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -Infinity | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | -64.76 | -62.42 | Specified in  Cell 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.14.5.2.1.2 Test Requirements

The UE shall send one Event D1 triggered measurement report, with a measurement reporting delay less than 3.2s from the beginning of time period T4.

NOTE: The delay time is calculated as (3.2 \* Kinter\_M1 \*  Ksatellite\_inter\_i  ) seconds, according to 8.13A.2.2, with Ksatellite\_inter\_i =1).

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.14.5.2.2 E-UTRAN HD-FDD Inter-frequency event triggered reporting in asynchronous cells for UE category M1 in CEModeA when DRX is used with time-based triggering

##### A.14.5.2.2.1 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 inter-frequency cell search requirements in clause 8.13A.2.1.2.1.

The test parameters are given in Table A.14.5.2.2.1-1 and A.14.5.2.2.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with EventA3 is used. The test consists of four successive time periods, with time duration of T1, T2, T3 and T4 respectively.

During time duration T1, the UE shall not have any timing information of cell 2. The assistance information provided for cell 2 indicates that *t-serviceStartNeigh* happens at the beginning of time T4.

At the beginning of T2 the transmission power of cell 2, configured in a different satellite, is increased to the same level as for cell 1. As the UE has not reached *t-serviceStartNeigh* for this frequency layer, UE shall skip the measurement gaps in this interval and no report is made.

At the beginning of T3 the transmission power of cell 2 is turned down, such that it become an unknown cell for the UE after 5 seconds.

At the beginning of T4, the transmission power of cell 2 increased to the same level as for cell 1. This shall result in reporting of event A3.

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Table A.14.5.2.2.1-1: General test parameters for E-UTRAN HD-FDD Inter-frequency event triggered reporting in asynchronous cells for UE category M1 in CEModeA when DRX is used with time-based triggering

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number | |  | 1,2 |  |
| Satellite Orbit Configuration | |  | NGSO |  |
| Active Cell | |  | Cell 1 |  |
| Neighbour cell | |  | Cell 2 | Cell to be identified |
| CP length | |  | Normal |  |
| DRX | |  | ON |  |
| DRX Cycle | |  | 1.28 | The value shall be used for all cells in the test. |
| 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 | 8 |  |
| T3 | | s | >5 |  |
| T4 | | s | 8 |  |

Table A.14.5.2.2.1-2: E-UTRAN HD-FDD Inter-frequency event triggered reporting in asynchronous cells for UE category M1 in CEModeA when DRX is used with time-based triggering

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | **Cell 2** | | | |
| **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| E-UTRA RF Channel Number |  | 1 | | | | 2 | | | |
| Satellite Assistance Information (Clause A.3.28.5) |  | SSC.2 | | | | NSC.4 | | | |
| BW**channel** | MHz | 1.4 | | | | | | | |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.49 HD-FDD | | | | R.49 HD-FDD | | | |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R.47 HD-FDD | | | | R.47 HD-FDD | | | |
| OCNG Patterns |  | OP.7 FDD | | | | OP.7 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 | 4 | 4 | -infinity | 4 | -infinity | 4 |
| Ês/Iot Note 3 | dB | 4 | -1.46 | 4 | -1.46 | -infinity | -1.46 | -infinity | -1.46 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -94 | -94 | -infinity | -94 | -infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | -64.76 | -62.42 | Specified in  Cell 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.14.5.2.2.2 Test Requirements

The UE shall send one Event D1 triggered measurement report, with a measurement reporting delay less than 3.2s from the beginning of time period T4.

NOTE: The delay time is calculated as (3.2 \* Kinter\_M1 \*  Ksatellite\_inter\_i  ) seconds, according to 8.13A.2.2, with Ksatellite\_inter\_i =1).

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.14.5.2.3 E-UTRAN HD-FDD Inter-frequency event triggered reporting in asynchronous cells for UE category M1 in CEModeB when DRX is used with time-based triggering

##### A.14.5.2.3.1 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 inter-frequency cell search requirements in clause 8.13A.2.1.2.1.

The test parameters are given in Table A.14.5.2.3.1-1 and A.14.5.2.3.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with EventA3 is used. The test consists of four successive time periods, with time duration of T1, T2, T3 and T4 respectively.

During time duration T1, the UE shall not have any timing information of cell 2. The assistance information provided for cell 2 indicates that *t-serviceStartNeigh* happens at the beginning of time T4.

At the beginning of T2 the transmission power of cell 2, configured in a different satellite, is increased to the same level as for cell 1. As the UE has not reached *t-serviceStartNeigh* for this frequency layer, UE shall skip the measurement gaps in this interval and no report is made.

At the beginning of T3 the transmission power of cell 2 is turned down, such that it become an unknown cell for the UE after 5 seconds.

At the beginning of T4, the transmission power of cell 2 increased to the same level as for cell 1. This shall result in reporting of event A3.

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Table A.14.5.2.3.1-1: General test parameters for E-UTRAN HD-FDD Inter-frequency event triggered reporting in asynchronous cells for UE category M1 in CEModeB when DRX is used with time-based triggering

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number | |  | 1,2 |  |
| Satellite Orbit Configuration | |  | NGSO |  |
| Active Cell | |  | Cell 1 |  |
| Neighbour cell | |  | Cell 2 | Cell to be identified |
| CP length | |  | Normal |  |
| DRX | |  | ON |  |
| DRX Cycle | |  | 0.64 | The value shall be used for all cells in the test. |
| 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 | 20 |  |
| T3 | | s | >5 |  |
| T4 | | s | 15 |  |

Table A.14.5.2.3.1-2: Cell specific test parameters for E-UTRAN HD-FDD Inter-frequency event triggered reporting in asynchronous cells for UE category M1 in CEModeB when DRX is used with time-based triggering

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | **Cell 2** | | | |
| **T1** | **T2** | **T3** | **T4** | **T1** | **T2** | **T3** | **T4** |
| E-UTRA RF Channel Number |  | 1 | | | | 2 | | | |
| Satellite Assistance Information (Clause A.3.28.5) |  | SSC.2 | | | | NSC.4 | | | |
| BW**channel** | MHz | 1.4 | | | | | | | |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.53 HD-FDD | | | | R.53 HD-FDD | | | |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R.51 HD-FDD | | | | R.51 HD-FDD | | | |
| OCNG Patterns |  | OP.7 FDD | | | | OP.7 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 | -12 | -12 | -12 | -12 | -infinity | -4 | -infinity | -4 |
| Ês/Iot Note 3 | dB | -12 | -12 | -12 | -12 | -infinity | -4 | -infinity | -4 |
| RSRP Note 3 | dBm/15 kHz | -110 | -110 | -110 | -110 | -infinity | -102 | -infinity | -102 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.95 | -69.21 | Specified in  Cell 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.14.5.2.3.2 Test Requirements

The UE shall send one Event D1 triggered measurement report, with a measurement reporting delay less than 14.5s from the beginning of time period T4.

NOTE: The delay time is calculated as (22.6 \* Kinter\_M1 \*  Ksatellite\_inter\_i  ) cycles, according to 8.13A.3.2, with Ksatellite\_inter\_i =1).

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.

End of Change