**3GPP TSG- Meeting #**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** |  | **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:***  | Draf CR TC for FR1 intra-freq measurments without gaps with interruptions |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***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:*** | Addition of new test case for UE in LTE cell performing gapless NR inter-RAT measurements  |
|  |  |
| ***Summary of change:*** | New test case for interruption ratio verification New test case for measurement delay without gaps |
|  |  |
| ***Consequences if not approved:*** | No test cases for inter RAT NR measurements with interruptions are defined |
|  |  |
| ***Clauses affected:*** | A.8.4.2.y (new), A.8.x (new) |
|  |  |
|  | **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:*** | Both test cases in this CR take the procedure and configuration from A.8.4.2.1 as a baseline. The calculation of the interruption ratio and measurement cycle in accordance to the configuration parameters:* SMTC period = 20 ms
* L = 1 ms
* Tcycle = max(80, SMTC period)\* Nfreq = 80
* D = 2 ms / 80 ms = 2. 5 % interruption ratio
* For a UE that supports interRAT-NeedForInterruptionNR-r18=’nogap-interruption’
	+ TPSS/SSS\_sync\_irat = max(600ms, ceil(8 × Kp) × max(TLB, SMTC period)) × Nfreq = max(600, ceil(8\*1) x 80) = 640 ms
	+ T SSB\_measurement\_period\_irat = max(200ms, ceil(8 × Kp) × max(TLB, SMTC period)) × Nfreq = max(200, 8 x 80) = 640 ms
* For a UE that supports interRAT-NeedForInterruptionNR-r18=’nogap-nointerruption’
	+ TPSS/SSS\_sync\_irat = max(600ms, ceil(8 × Kp) × max(TLB, SMTC period)) × Nfreq = max(600, ceil(8\*1) x 20) = 600 ms
	+ T SSB\_measurement\_period\_irat = max(200ms, ceil(8 × Kp) × max(TLB, SMTC period)) × Nfreq = max(200, 8 x 20) = 200 ms
 |
|  |  |
| ***This CR's revision history:*** |  |

## <Start of Change #1>

##### A.8.4.2.y NR Inter-RAT event triggered reporting tests for FR1 without gaps when DRX is not used

###### A.8.4.2.y.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event when performing inter-RAT NR measurements without gaps and with interruptions. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

The purpose of this test is also to verify that the interruption ratio does not exceed the limits for the LTE PCell during the inter-RAT NR measurement without gaps and with interruptions. This test will verify the interruption ratio for LTE PCell in standalone LTE specified in clause 7.8.2.22.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.Y.1-1, A.8.4.2.Y.1-2, A.8.4.2.Y.1-3 and A.8.4.2.Y.1-4.

The serving frequency should be selected for this test case should be one in which the UE reports UE capabilities interRAT-NeedForGapsNR-r16=FALSE and interRAT-NeedForInterruptionNR-r18=’nogap-interruption’ or interRAT-NeedForInterruptionNR-r18=’nogap-nointerruption’.

No measurement gap is configured for the test. UE is continuously scheduled in DL in LTE PCell during the test.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 Inter RAT neighbour becomes better than threshold) [16] 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 NR cell 2.

Table A.8.4.2.Y.1-1: NR inter-RAT event triggered reporting tests without gaps and with interruptions

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations. |

Table A.8.4.2.Y.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without gaps and with interruptions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
|  |  |  |  |
| E-UTRA RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 | One E-UTRAcarrier frequency is used. |
| NR RF Chanel Number |  | 1, 2, 3, 4, 5, 6 | 1 | One FR1 NR carrier frequency is used. |
| Active cell |  | 1, 2, 3, 4, 5, 6 | E-UTRA cell 1 (PCell) | E-UTRA cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell |  | 1, 2, 3, 4, 5, 6 | NR cell 2 | NR cell 2 is on NR RF channel number 1. |
| b1-ThresholdNR | dBm | 1, 2, 3, 4, 5, 6 | Note 1 | SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16] |
| Hysteresis | dB | 1, 2, 3, 4, 5, 6 | 0 |  |
| CP length |  | 1, 2, 3, 4, 5, 6 | Normal |  |
| TimeToTrigger | s | 1, 2, 3, 4, 5, 6 | 0 |  |
| Filter coefficient |  | 1, 2, 3, 4, 5, 6 | 0 | L3 filtering is not used |
| DRX |  | 1, 2, 3, 4, 5, 6 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | Asynchronous cells.The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | 2, 3, 5, 6 | 3μs | Synchronous cells. |
| T1 | s | 1, 2, 3, 4, 5, 6 | 5 |  |
| T2 | s | 1, 2, 3, 4, 5, 6 | 2 |  |
| Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2.Y.1-4 |

Table A.8.4.2.Y.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neighbour cell in FR1 without gaps and with interruptions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 1 |
|  |  |  | T1 | T2 |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 1 |
| Duplex mode |  | 1, 2, 3 | FDD |
| 4, 5, 6 | TDD |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 5 MHz: NRB,c = 2510 MHz: NRB,c = 5020 MHz: NRB,c = 100 |
| PDSCH parameters:DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.7 FDD10 MHz: R.3 FDD20 MHz: R.6 FDD |
|  |  | 4, 5, 6 | 5 MHz: R.4 TDD10 MHz: R.0 TDD20 MHz: R.3 TDD |
| PCFICH/PDCCH/PHICH parameters:DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 5 MHz: R.11 FDD10 MHz: R.6 FDD20 MHz: R.10 FDD |
|  |  | 4, 5, 6 | 5 MHz: R.11 TDD10 MHz: R.6 TDD20 MHz: R.10 TDD |
| OCNG PatternsNote2 |  | 1, 2, 3 | 5 MHz: OP.20 FDD10 MHz: OP.10 FDD20 MHz: OP.17 FDD |
|  |  | 4, 5, 6 | 5 MHz: OP.9 TDD10 MHz: OP.1 TDD20 MHz: OP.7 TDD |
| b2-Threshold1 | dBm | 1, 2, 3, 4, 5, 6 | -77 |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 |
| PBCH\_RB |  |  |  |
| PSS\_RA |  |  |  |
| SSS\_RA |  |  |  |
| PCFICH\_RB |  |  |  |
| PHICH\_RA |  |  |  |
| PHICH\_RB |  |  |  |
| PDCCH\_RA |  |  |  |
| PDCCH\_RB |  |  |  |
| PDSCH\_RA |  |  |  |
| PDSCH\_RB |  |  |  |
| OCNG\_RANote3 |  |  |  |
| OCNG\_RBNote3 |  |  |  |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -104 |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | 17 | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -87 | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -59.13+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition Note6 |  | 1, 2, 3, 4, 5, 6 | AWGN |
| Antenna Configuration and Correlation Matrix Note6 |  | 1, 2, 3, 4, 5, 6 | 1x2 |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.Note 3: 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 4: 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 5: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. |

Table A.8.4.2.Y.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 |
|  |  |  | T1 | T2 |
| NR RF Channel Number |  | 1, 2, 3, 4, 5, 6 | 1 |
| Duplex mode |  | 1, 4 | FDD |
|  |  | 2, 3, 5, 6 | TDD |
| TDD configuration |  | 2, 5 | TDDConf.1.1 |
|  |  | 3, 6 | TDDConf.2.1 |
| BWchannel | MHz | 1, 2, 4, 5 | 10: NRB,c = 52 |
|  |  | 3, 6 | 40: NRB,c = 106  |
| OCNG Patterns defined in A.3.2.1.1 (OP.1)  |  | 1, 2, 3, 4, 5, 6 | OP.1 |
| SMTC configuration defined in A.3.11 |  | 1, 4 | SMTC.2 |
|  |  | 2, 3, 5, 6 | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | kHz | 1, 2, 4, 5 | 15 |
|  |  | 3, 6 | 30 |
| b1-ThresholdNR | dBm/SCS | 1, 2, 4, 5 | -101 |
|  |  | 3, 6 | -98 |
| EPRE ratio of PSS to SSS |  | 1, 2, 3, 4, 5, 6 | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  |
| EPRE ratio of PDSCH DMRS to SSS  |  |  |  |
| EPRE ratio of PDSCH to PDSCH  |  |  |  |
| EPRE ratio of OCNG DMRS to SSS (Note 1) |  |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  |
| Note2 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -98 |
| Note2 | dBm/SCS | 1, 2, 4, 5 | -98 |
| 3, 6 | -95 |
| SS-RSRP Note 3 | dBm/SCS | 1, 2, 4, 5 | -Infinity | -91 |
| 3, 6 | -Infinity | -88 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
|  | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 |
| IoNote3 | dBm/9.36MHz | 1, 2, 4, 5 | -70.05 | -62.26 |
| dBm/38.16MHz | 3, 6 | -63.95 | -56.16 |
| Propagation Condition  |  | 1, 2, 3, 4, 5, 6 | AWGN |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 |
| 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: 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 to be fulfilled.Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |

##### A.8.4.2.Y.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1 and T2. During both time durations the interruption ratio should not exceed 2.5%.

In the test, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2.

* D1 = 1280 for a UE that supports interRAT-NeedForInterruptionNR-r18=’nogap-interruption’
* D1 = 800 for a UE that supports interRAT-NeedForInterruptionNR-r18=’nogap-nointerruption’

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

The UE is not required to report SSB time index.

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.

## <End of Change #1>