**3GPP TSG-RAN4 Meeting #104-e *R4-221xxxx***

 **Online, , August 15th 2022 - Augut 26th 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **17.6.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | DraftCR TC#3 on Concurrent Measurement Gaps |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | RAN4 |
|  |  |
| ***Work item code:*** | NR\_MG\_enh-Perf |  | ***Date:*** | 2022-08-10 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | Introduction Test for concurrent measurment gaps for SA NR - E-UTRAN and NR FR2 cuncorrent event-triggered reporting in non-DRX in FR1 |
|  |  |
| ***Summary of change:*** | TC#3 in the agreed WF (R4-2210585) in RAN4#103 meeting. SA NR - E-UTRAN and NR FR2 cuncorrent event-triggered reporting in non-DRX in FR1.Test case is based on following test cases:* A.6.6.3.1 SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1
* A.7.6.2.5 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)
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|  |  |
| ***Consequences if not approved:*** | Incomplete test coverage |
|  |  |
| ***Clauses affected:*** | New clause |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

A.x.x.x.1 SA NR - E-UTRAN and NR FR1 concurrent event-triggered reporting in non-DRX in FR1

A.x.x.x.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of concurrent inter-RAT E-UTRAN and NR FR1 measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2, 9.4.3, 9.3.4 and 9.3.5.

In each test there are three cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the NR PCell, Cell 2 is an Inter-frequency NR FR1 neighbour cell on NR RF channel 2 and Cell 3 is an inter-RAT E-UTRAN neighbour cell.

In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used for the E-UTRAN cell (cell 3). In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used for the NR FR1 cell (cell 2).

Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2 and Cell 3.

In the test two concurrent per-UE measurement gap pattern configurations # 0 as defined in Table A.x.x.x.x.1-2 are provided for a UE. Two measurement gap patterns (MeasGapId #0 and MeasGapId #1) are configured with the gap pattern ID #0 as defined in Table A.x.x.x.x.1-2. MeasGapId #1 is configured with a higher priority than MeasGapId #0. MeasGapId #0 and MeasGapId #1 are associated with the MOs for RF channel numbers #1 and #2, respectively.

Supported test configurations are shown in table A.x.x.x.x.1-1. General test parameters are provided in Table A.x.x.x.x.1-2 below. Test parameters for Cell 1, Cell 2 and Cell 3, valid for both time duration T1 and T2, are provided in Tables A.x.x.x.x.1-3 and A.6.6.3.1.1-4, respectively.

The test parameters and configurations are given in Tables A.x.x.x.x.1-1, A.x.x.x.x.1-2, and A.x.x.x.x.1-3.

**Table A.x.x.x.x.1-1: Supported test configurations in SA concurrent inter-RAT E-UTRAN and NR FR2 inter-frequency event triggered reporting in non-DRX with PCell in FR1**

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

**Table A.x.x.x.x.1-2: General test parameters for SA concurrent inter-RAT E-UTRAN and NR FR2 inter-frequency event triggered reporting in non-DRX with PCell in FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| NR RF Channel Number |  | 1 - 6 | 1, 2 | 2 NR carrier frequency is used in the test. 1 FR1 and FR2 carrier frequency. |
| LTE RF Channel Number |  |  |  | 1 LTE carrier frequency is used in the test |
| Channel Bandwidth | MHz | 1 - 6 | As specified in Tables A.6.6.3.1.1-2 and A.6.6.3.1.1-3. |  |
| Active cell |  | 1 - 6 | NR Cell 1 (PCell in FR1) | Cell 1 is on RF channel number 1 |
| Neighbour cell 1 |  | 1 - 6 | Cell 2 (NR FR2) | Cell 2 is on RF channel number 2 |
| Neighbour cell 2 |  | 1 - 6 | Cell 3 (LTE) | Cell 3 is on RF channel number 3 |
| Gap Pattern Id #1 |  | 1 - 6 | 0 | As specified in Clause Table 9.1.2-1. Per-UE gap pattern. |
| Gap Pattern Id #2 |  | 1 - 6 | 0 | Gap Pattern Id #2 is offsetted 20ms compared to Gap Pattern Id #1 |
| Measurement gap offset |  | 1 – 6 | 19 for Gap pattern Id #1 |  |
| NR measurement quantity |  |  | SS-RSRP | Measurement quantity for Cell 1 |
| NR measurement quantity |  |  | SS-RSRP | Measurement quantity for Cell 2 |
| Inter-RAT E-UTRAN measurement quantity |  |  | RSRP | Measurement quantity for Cell 3 |
| CSI-RS for tracking parameters on NR RF Channel 1 |  | 1, 4 | TRS.1.1 FDD |  |
| 2, 5 | TRS.1.1 TDD |
| 3, 6 | TRS.1.2 TDD |
| SMTC-SSB parameters on NR RF Channel 1 |  | 1, 4 | SSB.1 FR1 | As specified in clause A.3.10.1 |
| 2, 5 | SSB.1 FR1 | As specified in clause A.3.10.1 |
| 3, 6 | SSB.2 FR1 | As specified in clause A.3.10.1 |
| SMTC-SSB parameters on NR RF Channel 2 |  | 1 - 6 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| b2-Threshold1 | dBm |  | Note 1 | SS-RSRP threshold for SS-RSRP measurement on Cell 3 for event B2 |
| b2-Threshold2EUTRA | dBm |  | -95 | E-UTRAN RSRP threshold for SS-RSRP measurement on Cell 3 for event B2 |
| Hysteresis | dB | 1 – 6 | 0 |  |
| TimeToTrigger | s | 1 – 6 | 0 |  |
| Filter coefficient |  | 1 – 6 | 0 | L3 filtering is not used |
| *offsetMO* | dB | 1 - 6 | 6 | NR Cell 2 |
| *a4-Threshold* | dBm | 1 – 6 | -105 | NR Cell 2 |
| DRX |  |  | OFF | OFF |
| Time offset between serving and neighbour cells |  | 1, 4 | 3ms | Asynchronous cells NR cells.The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| 2, 3, 5, 6 | 3μs | Synchronous NR cells. |
| T1 | s | 1 – 6 | 5 | for LTE Cell 3 and NR FR2 Cell 2 |
| T2 | s | 1 - 6 | 5 | for LTE Cell 3 |
| 5.2 for PC1; 3.5 for other PC | for NR FR2 Cell 2 |

Table A.x.x.x.x.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | **Cell 2** |
|  |  |  | **T1** | **T2** | **T1** | **T2** |
| AoA setup |  | Config 1,2,3 | N/A | Setup 1 as specified in clause A.3.15 |
| Beam AssumptionNote 7 |  | Config 1,2,3 | N/A | Rough |
| NR RF Channel Number |  | Config 1,2,3 | 1 | 2 |
| Duplex mode |  | Config 1 | FDD | TDD |
|  |  | Config 2,3 | TDD | TDD |
| TDD configuration |  | Config 1 | Not Applicable | TDDConf.3.1 |
|  |  | Config 2 | TDDConf.1.1 | TDDConf.3.1 |
|  |  | Config 3 | TDDConf.2.1 | TDDConf.3.1 |
| BWchannel | MHz | Config 1 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 2 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 3 | 40: NRB,c = 106 | 100: NRB,c = 66 |
| Data RBs allocated |  | Config 1 | 52 | 66 |
| Config 2 | 52 | 66 |
| Config 3 | 106 | 66 |
| BWP BW | MHz | Config 1 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 2 | 10: NRB,c = 52 | 100: NRB,c = 66 |
|  |  | Config 3 | 40: NRB,c = 106 | 100: NRB,c = 66 |
| BWP configuration | Initial DL BWP |  | Config 1,2,3 | DLBWP.0.1 | N/A |
|  | Initial UL BWP |  |  | ULBWP.0.1 | N/A |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | N/A |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | N/A |
| OCNG Patterns defined in A.3.2.1.1 (OP.1)  |  | Config 1,2,3 | OP.1 | OP.1 |
| PDSCH Reference  |  | Config 1 | SR.1.1 FDD | - |
| measurement channel |  | Config 2 | SR.1.1 TDD |  |
|  |  | Config 3 | SR.2.1 TDD |  |
| RMSI CORESET Reference  |  | Config 1 | CR.1.1 FDD | - |
| Channel |  | Config 2 | CR.1.1 TDD |  |
|  |  | Config 3 | CR.2.1 TDD |  |
| Dedicated CORESET RMC configuration |  | Config 1 | CCR.1.1 FDD | - |
|  | Config 2 | CCR.1.1 TDD |  |
|  | Config 3 | CCR.2.1 TDD |  |
| SMTC configuration defined |  | Config 1 | SMTC.2 | SMTC.2 |
| in A.3.11.1 and A.3.11.2 |  | Config 2,3 | SMTC.1 | SMTC.1 |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 15 | 120 |
|  |  | Config 3 | 30 | 120 |
| EPRE ratio of PSS to SSS |  |  |  |  |
| 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 |  | Config 1,2,3 | 0 | 0 |
| 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) |  |  |  |  |
| Ês | dBm/SCS | Config 1,2,3 |  | -Infinity | -87 |
| SSB\_RP Note 3 | dBm/SCS | Config 1,2 |  | -Infinity | -87 |
|  | Note5 | Config 3 |  | -Infinity | -87 |
| BB Note 8 | dB | Config 1,2,3 | NALink only, see clause | -Infinity | 14.69 |
|  | dBm/95.04 MHz Note5 | Config 1,2,3 | A.3.7A | -Infinity | -58.01 |
| Propagation Condition  |  | Config 1,2,3 | AWGN |
| Note 1: OCNG 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: VoidNote 3: SS B\_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: VoidNote 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zoneNote 6: As observed with 0 dBi gain antenna at the centre of the quiet zoneNote 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementationNote 8: Calculation of Es/IotBB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBS from TS 38.101-2 [19] Table 6.2.1.3-4. |

**Table A.x.x.x.x.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Configuration** | **Cell 3** |
|  |  |  | **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 |
| 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 | -Infinity | 17 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 17 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -87 |
| IoNote5 | dBm/9MHz | 1, 2, 3, 4, 5, 6 | -76.22+10log (NRB,c /50) | -59.13+10log (NRB,c /50) |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low |
| 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. |

A.x.x.x.x.2 Test Requirements

In this test with per-UE gap, the UE shall send one Event A4 triggered measurement report for Cell 2, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

The UE shall send one Event B2 triggered measurement report for Cell 3 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2.

The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is 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.