**3GPP TSG-RAN4 Meeting #111 *R4-2409283***

**Fukuoka, Japan, 20 – 24 May, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **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:*** | draftCR on TC1 for MUSIM | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_DualTxRx\_MUSIM-Perf | | | | |  | ***Date:*** | | | 2024-04-23 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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:*** | | Based on WF WF R4-2406435, TC1 as follows needs to be defined for MUSIM gap related requirements.  *TC1: Inter-frequency event triggered reporting, 1 Type-2 gap + 1 periodic MUSIM gap, with partially partial overlapping among all configured gaps, MUSIM gap has lower and higher priority, priority based solution, SSB-based measurements, FR1.*  *Note: MUSIM gap has lower priority in one time duraiton, and MUSIM gap has higher priority in the next time duraiton.* | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce TC1 for MUSIM gap related requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Agreed TC is not implemented. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.6.6.2.X (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of Change 1>

#### A.6.6.2.X SA event triggered reporting tests for FR1 with MUSIM gap configured

##### A.6.6.2.X.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event on an inter-frequency layer based on measurement performed within measurement gaps when UE is also configured with MUSIM gaps. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4. In addition, the test will verify that UE makes correct transmission/reception during occasions of measurement gaps and MUSIM gaps that are dropped due to collision handling as defined in clause 9.1.10.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.X.1-1, A.6.6.2.X.1-2 and A.6.6.2.X.1-3.

Measurement gap and MUSIM gap pattern configurations defined in Table A.6.6.2.X.1-2 are provided to the UE.

Note: the signaling procedure to trigger the UE to request MUSIM gaps before the test equipment configures MUSIM gaps to the UE is left to comformance test implementation.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1 and T3, the UE shall not have any timing information of NR cell 2. During T1 and T2, MUSIM gap is configured with lower priority than the measurement gap. At the beginning of T3, test equipment reconfigures the priority of MUSIM gap such that MUSIM gap is configured with higher priority than the measurement gap during T3 and T4.

The TE schedules continuous DL data on PCell throughout the test.

Table A.6.6.2.X.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz 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  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

Table A.6.6.2.X.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
|  |  |  |  |
| NR RF Channel Number |  | Config 1,2,3 | 1, 2 | Two FR1 NR carrier frequencies is used. |
| Active cell |  | Config 1,2,3 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3 | NR cell2 | NR cell 2 is on NR RF channel number 2. |
| Measurement gap Pattern Id |  | Config 1,2,3 | 0 | As specified in clause 9.1.2-1. |
| Measurement gap offset | ms | Config 1,2,3 | 9 |  |
| MUSIM gap Pattern Id |  | Config 1,2,3 | 1 |  |
| MUSIM gap offset | ms | Config 1,2,3 | 2 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.1 FR1 | As specified in clause A.3.10.1 |
|  |  | Config 2 | SSB.1 FR1 | As specified in clause A.3.10.1 |
|  |  | Config 3 | SSB.2 FR1 | As specified in clause A.3.10.1 |
| A3-Offset | dB | Config 1,2,3 | -6 |  |
| Hysteresis | dB | Config 1,2,3 | 0 |  |
| CP length |  | Config 1,2,3 | Normal |  |
| TimeToTrigger | s | Config 1,2,3 | 0 |  |
| Filter coefficient |  | Config 1,2,3 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  |  | Config 2,3 | 3μs | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 |  |
| T2 | s | Config 1,2,3 | 1.3 |  |
| T3 | s | Config 1,2,3 | 5 |  |
| T4 | s | Config 1,2,3 | 1 |  |

Table A.6.6.2.X.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
|  | |  |  | T1 and T3 | T2 and T4 | T1 and T3 | T2 and T4 |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | | |
|  | |  | Config 2,3 | TDD | | | |
| TDD configuration | |  | Config 1 | Not Applicable | | | |
|  | |  | Config 2 | TDDConf.1.1 | | | |
|  | |  | Config 3 | TDDConf.2.1 | | | |
| BWchannel | | MHz | Config 1,2 | 10: NRB,c = 52 | | | |
|  | |  | Config 3 | 40: NRB,c = 106 | | | |
| BWP BW | | MHz | Config 1,2 | 10: NRB,c = 52 | | | |
|  | |  | Config 3 | 40: NRB,c = 106 | | | |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3 | DLBWP.0.1 | | NA | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | NA | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | NA | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | NA | |
| TRS configuration | |  | Config 1 | TRS.1.1 FDD | | NA | |
|  | |  | Config 2 | TRS.1.1 TDD | | NA | |
|  | |  | Config 3 | TRS.1.2 TDD | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1,2,3 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.1.1 FDD | |  | |
|  | |  | Config 2 | SR.1.1 TDD | |  | |
|  | |  | Config 3 | SR2.1 TDD | |  | |
| RMSI CORESET Reference Channel | |  | Config 1 | CR.1.1 FDD | |  | |
|  | |  | Config 2 | CR.1.1 TDD | |  | |
|  | |  | Config 3 | CR2.1 TDD | |  | |
| Dedicated CORESET Reference Channel | |  | Config 1 | CCR.1.1 FDD | |  | |
|  | Config 2 | CCR.1.1 TDD | |  | |
|  | Config 3 | CCR.2.1 TDD | |  | |
| SSB parameters | |  | Config 1 | SSB.1 FR1 | | SSB.5 FR1 | |
|  | |  | Config 2 | SSB.1 FR1 | | SSB.5 FR1 | |
|  | |  | Config 3 | SSB.2 FR1 | | SSB.6 FR1 | |
| SMTC configuration defined in A.3.11 | |  | Config 1 | SMTC.2 | | SMTC.5 | |
|  | |  | Config 2, 3 | SMTC.1 | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | |
|  | |  | Config 3 | 30 | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2,3 | 0 | | 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 |  | -98 | | -98 | |
| Note2 | | dBm/SCS | Config 1,2 | -98 | | -98 | |
|  | |  | Config 3 | -95 | | -95 | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94 | -94 | -Infinity | -91 |
|  | |  | Config 3 | -91 | -91 | -Infinity | -88 |
|  | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
|  | | dB | Config 1,2,3 | 4 | 4 | -Infinity | 7 |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | -70.05 | -62.26 |
|  | | dBm/38.16MHz | Config 3 | -58.49 | -58.49 | -63.94 | -56.15 |
| Propagation Condition | |  | Config 1,2,3 | AWGN | | 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: 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.6.6.2.X.2 Test Requirements

During T1 and T2, UE shall send HARQ ACK/NACK for the corresponding PDSCH scheduled in PCell in all the slots except for the case where PDSCH or PUCCH is overlapped with the measurement gap occasions.

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms 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.

During T3 and T4, after UE sends RRC ReconfigurationComplete message for the reconfiguration of MUSIM gap priority, UE shall send HARQ ACK/NACK for the corresponding PDSCH scheduled in PCell in all the slots except for the case where PDSCH or PUCCH is overlapped with

* MUSIM gap occasions, and
* measurement gap occasions that are not colliding with MUSIM gap.

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T4. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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>