**3GPP TSG-RAN4 Meeting #97-e *R4-2017249***

**Online, , 2nd Nov 2020 - 13th Nov 2020**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **DRAFT** | **rev** | 1 | **Current version:** | **16.5.0** |  |
|  | | | | | | | | |
| *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:*** | Test cases for NR -NR cell identification in connected mode for high speed | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | RAN WG4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_HST-Perf | | | | |  | ***Date:*** | | | 2020-10-23 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Add test cases for cell identification in high speed condition | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add test cases 2a and 2b as agreed in R4-2012182. Tests are based on existing event triggered reporting tests with following main updates :   * Change propagation condition * Change DRX cycle to 640ms * Change test requirement to 5+3\*640ms = 5120ms, and corresponding T2 to 6s | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | High speed enhanced RRM test coverage not as agreed | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.4.X (new), A.6.X | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS/TR .38.533.. CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Section numbers to be determined when structure of rest of test cases is decided. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

Change 1

#### A.4.X EN-DC event triggered reporting tests under DRX for UE configured with highSpeedMeasFlag-r16

##### A.4.X.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event for UE configured with highSpeedMeasFlag-r16. This test will partly verify the intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

##### A.4.X.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.X.1-1, A.4.X.1-2, A.4.X.1-3 and A.4.X.1-4 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and 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 3.

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. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.X.2-1: Supported test configurations

|  |  |
| --- | --- |
| 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.  Note 2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2 | |

Table A.4.X.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| ***highSpeedMeasFlag-r16*** |  | 1,2,3,4,5,6 | Present | To enable high speed measurement enhancements |
| Active cell |  | 1, 2, 3,4,5,6 | E-UTRAN Cell 1 and NR Cell 2 |  |
| Neighbour cell |  | 1, 2, 3,4,5,6 | NR Cell 3 | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3,4,5,6 | 1: Cell 1  2: Cell 2 and Cell 3 |  |
| SSB configuration |  | 1,4 | SSB.1 FR1 |  |
| 2,5 | SSB.1 FR1 |  |
| 3,6 | SSB.2 FR1 |  |
| SMTC configuration |  | 1,4 | SMTC.2 |  |
| 2,5 | SMTC.1 |  |
| 3,6 | SMTC.1 |  |
| A3-Offset | dB | 1, 2, 3,4,5,6 | -4.5 |  |
| CP length |  | 1, 2, 3,4,5,6 | Normal |  |
| Hysteresis | dB | 1, 2, 3,4,5,6 | 0 |  |
| Time To Trigger | 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 | DRX.2. | 640ms DRX cycle |
| Time offset between PCell and PSCell |  | 1, 2, 3,4,5,6 | 3 μs | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | 1,4 | 3 ms | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
| 2,5 | 3 μs | Synchronous cells |
| 3,6 | 3 μs | Synchronous cells |
| T1 | s | 1, 2, 3,4,5,6 | 5 |  |
| T2 | s | 1, 2, 3,4,5,6 | 6 |  |

Table A.4.X.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 2 | | Cell 3 | | |
| T1 | T2 | T1 | | T2 |
| TDD configuration |  | 1,4 | N/A | | N/A | | |
| 2,5 | TDDConf.1.1 | | TDDConf.1.1 | | |
| 3,6 | TDDConf.2.1 | | TDDConf.2.1 | | |
| PDSCH RMC configuration |  | 1,4 | SR.1.1 FDD | | N/A | | |
| 2,5 | SR.1.1 TDD | |
| 3,6 | SR.2.1 TDD | |
| RMSI CORESET RMC configuration |  | 1,4 | CR.1.1 FDD | | CR.1.1 FDD | | |
| 2,5 | CR.1.1 TDD | | CR.1.1 TDD | | |
| 3,6 | CR.2.1 TDD | | CR.2.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1,4 | CCR.1.1 FDD | | CCR.1.1 FDD | | |
| 2,5 | CCR.1.1 TDD | | CCR.1.1 TDD | | |
| 3,6 | CCR.2.1 TDD | | CCR.2.1 TDD | | |
| OCNG Patterns |  | 1, 2, 3,4,5,6 | OP.1 | | OP.1 | | |
| TRS configuration |  | 1,4 | TRS.1.1 FDD | | N/A | | |
| 2,5 | TRS.1.1 TDD | | N/A | | |
| 3,6 | TRS.1.2 TDD | | N/A | | |
| Initial BWP configuration |  | 1, 2, 3,4,5,6 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | | |
| Active DL BWP configuration |  | 1, 2, 3,4,5,6 | DLBWP.1.1 | | DLBWP.1.1 | | |
| Active UL BWP configuration |  | 1, 2, 3,4,5,6 | ULBWP.1.1 | | ULBWP.1.1 | | |
| RLM-RS |  | 1, 2, 3,4,5,6 | SSB | | SSB | | |
| Note 2 | dBm/SCS | 1,4 | -98 | | | | |
| 2,5 | -98 | | | | |
| 3,6 | -95 | | | | |
| Note 2 | dBm/15 kHz | 1,4 | -98 | | | | |
| 2,5 |
| 3,6 |
|  | dB | 1,4 | 4 | -1.46 | -Infinity | | -1.46 |
| 2,5 |
| 3,6 |
|  | dB | 1,4 | 4 | 4 | -Infinity | | 4 |
| 2,5 |
| 3,6 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1,4 | -94 | -94 | -Infinity | | -94 |
| 2,5 | -94 | -94 | -Infinity | | -94 |
| 3,6 | -91 | -91 | -Infinity | | -91 |
| Io | dBm/9.36 MHz | 1,4 | -64.60 | -62.25 | -64.60 | | -62.25 |
| dBm/9.36 MHz | 2,5 | -64.60 | -62.25 | -64.60 | | -62.25 |
| dBm/38.16 MHz | 3,6 | -58.50 | -56.16 | -58.50 | | -56.16 |
| Propagation Condition |  | 1, 2,4,5 | AWGN | | | AWGN 1944 Hz Note 4 | |
| 3,6 | AWGN | | | AWGN 3334 Hz Note 5 | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944Hz.  Note 5: The AWGN 3334 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 3334Hz. | | | | | | | |

##### A.4.X.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 5120 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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.

Change 2

#### A.6.Y SA event triggered reporting tests under DRX for UE configured with highSpeedMeasFlag-r16

#### A.6.Y.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event for UE configured with highSpeedMeasFlag-r16. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

##### A.6.Y.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.Y.2-1, A.6.Y.2-2 and A.6.Y.2-3 below. In the measurement controlinformation, a measurement object is configured for the frequency of the PCell, and 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.

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. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.Y.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 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.6.Y.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| ***highSpeedMeasFlag-r16*** |  | 1,2,3 | Present | To enable high speed measurement enhancements |
| Active cell |  | 1, 2, 3 | Cell 1 |  |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1 and Cell 2 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
| 2 | SSB.1 FR1 |  |
| 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| A3-Offset | dB | 1, 2, 3 | -4.5 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| Hysteresis | dB | 1, 2, 3 | 0 |  |
| Time To Trigger | s | 1, 2, 3 | 0 |  |
| Filter coefficient |  | 1, 2, 3 | 0 | L3 filtering is not used |
| DRX |  | 1, 2, 3 | DRX.2 | 640ms DRX cycle |
| Time offset between serving and neighbour cells |  | 1 | 3 ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| 2 | 3 μs | Synchronous cells |
| 3 | 3 μs | Synchronous cells |
| T1 | s | 1, 2, 3 | 5 |  |
| T2 | s | 1, 2, 3 | 6 |  |

Table A.6.Y.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | | **Cell 2** | | |
| **T1** | **T2** | **T1** | | **T2** |
| TDD configuration |  | 1 | TN/A | | TN/A | | |
| 2 | TDDConf.1.1 | | TDDConf.1.1 | | |
| 3 | TDDConf.2.1 | | TDDConf.2.1 | | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | | |
| 2 | SR.1.1 TDD | |
| 3 | SR.2.1 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | CR.1.1 FDD | | |
| 2 | CR.1.1 TDD | | CR.1.1 TDD | | |
| 3 | CR.2.1 TDD | | CR.2.1 TDD | | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | CCR.1.1 FDD | | |
| 2 | CCR.1.1 TDD | | CCR.1.1 TDD | | |
| 3 | CCR.2.1 TDD | | CCR.2.1 TDD | | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | | |
| TRS configuration |  | 1 | TRS.1.1 FDD | | N/A | | |
| 2 | TRS.1.1 TDD | | N/A | | |
| 3 | TRS.1.2 TDD | | N/A | | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | DLBWP.1.1 | | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | ULBWP.1.1 | | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | | |
| Note 2 | dBm/SCS | 1 | -98 | | | | |
| 2 | -98 | | | | |
| 3 | -95 | | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | | |
| 2 |
| 3 |
|  | dB | 1 | 4 | -1.46 | -Infinity | | -1.46 |
| 2 |
| 3 |
|  | dB | 1 | 4 | 4 | -Infinity | | 4 |
| 2 |
| 3 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | | -94 |
| 2 | -94 | -94 | -Infinity | | -94 |
| 3 | -91 | -91 | -Infinity | | -91 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | -64.60 | | -62.25 |
| dBm/9.36 MHz | 2 | -64.60 | -62.25 | -64.60 | | -62.25 |
| dBm/38.16 MHz | 3 | -58.50 | -56.16 | -58.50 | | -56.16 |
| Propagation Condition |  | 1, 2 | AWGN | | | AWGN 1944Hz Note 4 | |
| 3 | AWGN | | | AWGN 3334Hz Note 5 | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944Hz.  Note 5: The AWGN 3334 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 3334Hz. | | | | | | | |

##### A.6.Y.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 5120 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

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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.