**3GPP TSG- Meeting # *R4-2017142***

**, 2nd – 13 November 2020**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **3** | **CR** | **1361** | **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:***  | Cell reselection to FR2 inter-frequency NR case under power saving  |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_UE\_pow\_sav-Perf |  | ***Date:*** | 2020-11-11 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | Inter-frequency cell reselection requirements under relaxed monitoring are specified. However, test cases to verify these requirements are missing.  |
|  |  |
| ***Summary of change:*** | The following 2 new test cases are defined:* FR2 inter-frequency NR cell reselection test when low mobility criterion is met
* FR2 inter-frequency NR cell reselection test with not-at-cell edge criterion is met.
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| ***Consequences if not approved:*** | The performance of the cell reselection to FR2 inter-frequency requirements for UE when relaxed monitoring is applied will not be verified. |
|  |  |
| ***Clauses affected:*** | A.7.1.1.3, A.7.1.1.3.1, A.7.1.1.3.2, A.7.1.1.3.3, A.7.1.1.4, A.7.1.1.4.1, A.7.1.1.4.2, A.7.1.1.4.3 |
|  |  |
|  | **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:*** |  |

----------------------------------------------------- Beginning of Change #1 ------------------------------------------------------------

#### A.7.1.1.3 Cell reselection to FR2 inter-frequency NR case for UE fulfilling low mobility criterion

##### A.7.1.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling low mobility criterion specified in clause 4.2.2.10.2.

##### A.7.1.1.3.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.7.1.1.3.2-1, A.7.1.1.3.2-2 and A.7.1.1.3.2-3. The test consists of two successive time periods, with time duration of T1 and T2. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with l*owMobilityEvalutation* criterion [2].

Table A.7.1.1.3.2-1: Supported test configurations FR2 inter frequency NR cell re-selection test case for UE fulfilling low mobility criterion

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. |

Table A.7.1.1.3.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case for UE fulfilling low mobility criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell2 | The UE camps on cell2 and fulfils low mobility (*lowMobilityEvalutation* [2]) criterion. |
| Neighbour cell | 1, 2 | Cell1 |
| T1 final condition | Active cell |  | 1, 2 | Cell1 | The UE reselects to low priority cell1 during T1  |
| Neighbour cell |  | 1, 2 | Cell2 |
| T2 final condition | Active cell |  | 1, 2 | Cell2 | The UE reselects to high priority cell2 during T2 |
| Neighbour cell |  |  | Cell1 |
| RF Channel Number |  | 1, 2 | 1, 2 |  |
| Time offset between cells |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SSB configuration |  | 1 | SSB.1 FR2 |  |
| 2 | SSB.2 FR2 |  |
| SMTC configuration |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | s | 1, 2 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell |  | 1, 2 | Not configured |  |
| T1 | s | 1, 2 | 445 | T1 needs to be long enough to allow cell re-selection to already known cell1 |
| T2 | s | 1, 2 | 85 | T2 needs to be long enough to allow cell re-selection to already known cell2 |

Table A.7.1.1.3.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | Cell 2 |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | SR.3.1 TDD |
| RMSI CORESET parameters |  | 1, 2 | CR.3.1 TDD | CR.3.1 TDD |
| RMSI CORESET RMC configuration  |  | 1, 2 | CCR.3.1 TDD | CCR.3.1 TDD |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | OP.1 defined in A.3.2.1 |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | DLBWP.0.1 |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | ULBWP.0.1 |
| RLM-RS |  | 1, 2 | SSB | SSB |
| Qrxlevmin | dBm/SCS | 1 | -140 | -140 |
|  |  | 2 | -137 | -137 |
| Pcompensation | dB | 1, 2 | 0 | 0 |
| Qhysts | dB | 1, 2 | 0 | 0 |
| Qoffsets, n | dB | 1, 2 | 0 | 0 |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | SS-RSRP |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | Setup 1 defined in A.3.15.1 |
| Beam assumptionNote 4 |  | 1, 2 | Rough | Rough |
|  | dB | 1, 2 | 8 | 8 | -3 | 8 |
|  Note2 | dBm/SCS | 1 | -93 | -93 |
| 2 | -90 | -90 |
|  Note2 | dBm/15 kHz | 1, 2 | -102 | -102 |
|  | dB | 1, 2 | 8 | 8 | -3 | 8 |
| SS-RSRP Note3 | dBm/SCS | 1 | -85 | -85 | -96 | -85 |
|  |  | 2 | -82 | -82 | -93 | -82 |
| Io | dBm/95.04 MHz | 1 | -55.37 | -55.37 | -62.25 | -55.37 |
|  |  | 2 | -52.37 | -52.37 | -59.25 | -52.37 |
| TreselectionNR | s | 1, 2 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2 | 50 | Not sent |
| SSearchDeltaP | dB | 1, 2 | 6 | 6 |
| TSearchDeltaP | s | 1, 2 | 300 | 300 |
| Threshx, high | dB | 1, 2 | 48 | 48 |
| Threshserving, low | dB | 1, 2 | 44 | 44 |
| Threshx, low  | dB | 1, 2 | 50 | 50 |
| Propagation Condition  |  | 1, 2 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

##### A.7.1.1.3.3 Test Requirements

The cell reselection delay to an already detected low priority cell (Cell 1) for UE fulfilling low mobility criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 79 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling low mobility criterion is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 439 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE 1: The cell re-selection delay to an already detected low priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

NOTE 2: The cell re-selection delay to an already detected higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate, NR\_ inter + TSI-NR

Where:

Tevaluate, NR\_ inter See Table 4.2.2.10.2-1 in clause 4.2.2.10.2

TSI-NR Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 78.08 s, allow 79 s for the cell re-selection delay to an already detected low priority cell in the test case.

This gives a total of 438.08 s, allow 439 s for the cell re-selection delay to an already detected high priority cell in the test case.

------------------------------------------------------------- End of change #1 ------------------------------------------------------------

------------------------------------------------------------- Start of change #2 ------------------------------------------------------------

#### A.7.1.1.4 Cell reselection to FR2 inter-frequency NR case for UE fulfilling not-at-cell edge criterion

##### A.7.1.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling not-at-cell edge criterion specified in clause 4.2.2.10.3.

##### A.7.1.1.4.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.7.1.1.4.2-1, A.7.1.1.4.2-2 and A.7.1.1.4.2-3. The test consists of two successive time periods, with time duration of T1 and T2. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with *cellEdgeEvaluation* criterion [2].

Table A.7.1.1.4.2-1: Supported test configurations FR2 inter frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

|  |  |  |
| --- | --- | --- |
| Configuration | Description for serving cell | Description for target cell |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. |

Table A.7.1.1.4.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Initial condition | Active cell |  | 1, 2 | Cell2 | The UE camps on cell2 and fulfils not-at-cell edge (*cellEdgeEvaluation* [2]) criterion. |
| Neighbour cell | 1, 2 | Cell1 |
| T1 final condition | Active cell |  | 1, 2 | Cell1 | The UE reselects to low priority cell1 during T1  |
| Neighbour cell |  | 1, 2 | Cell2 |
| T2 final condition | Active cell |  | 1, 2 | Cell2 | The UE reselects to high priority cell2 during T2 |
| Neighbour cell |  | 1, 2 | Cell1 |
| RF Channel Number |  | 1, 2 | 1, 2 |  |
| Time offset between cells |  | 1, 2 | 3 μs | Synchronous cells |
| Access Barring Information | - | 1, 2 | Not Sent | No additional delays in random access procedure. |
| SSB configuration |  | 1 | SSB.1 FR2 |  |
| 2 | SSB.2 FR2 |  |
| SMTC configuration |  | 1, 2 | SMTC pattern 1 |  |
| DRX cycle length | s | 1, 2 | 0.64 | The value shall be used for all cells in the test. |
| PRACH configuration index |  | 1, 2 | 190 | The detailed configuration is specified in TS 38.211 clause 6.3.3.2 |
| rangeToBestCell |  | 1, 2 | Not configured |  |
| T1 | s | 1, 2 | 145 | T1 needs to be long enough to allow cell re-selection to already known cell. |
| T2 | s | 1, 2 | 85 | T2 needs to be long enough to allow cell re-selection to already known cell. |

Table A.7.1.1.4.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | Cell 2 |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | TDDConf.3.1 |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | SR.3.1 TDD |
| RMSI CORESET parameters |  | 1, 2 | CR.3.1 TDD | CR.3.1 TDD |
| RMSI CORESET RMC configuration  |  | 1, 2 | CCR.3.1 TDD | CCR.3.1 TDD |
| OCNG Pattern |  | 1, 2 | OP.1 defined in A.3.2.1 | OP.1 defined in A.3.2.1 |
| Initial DL BWP configuration |  | 1, 2 | DLBWP.0.1 | DLBWP.0.1 |
| Initial UL BWP configuration |  | 1, 2 | ULBWP.0.1 | ULBWP.0.1 |
| RLM-RS |  | 1, 2 | SSB | SSB |
| Qrxlevmin | dBm/SCS | 1 | -140 | -140 |
|  |  | 2 | -137 | -137 |
| Pcompensation | dB | 1, 2 | 0 | 0 |
| Qhysts | dB | 1, 2 | 0 | 0 |
| Qoffsets, n | dB | 1, 2 | 0 | 0 |
| Cell\_selection\_and\_reselection\_quality\_measurement |  | 1, 2 | SS-RSRP | SS-RSRP |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | Setup 1 defined in A.3.15.1 |
| Beam assumptionNote 4 |  | 1, 2 | Rough | Rough |
|  | dB | 1, 2 | 8 | 8 | -3 | 8 |
|  Note2 | dBm/SCS | 1 | -93 | -93 |
| 2 | -90 | -90 |
|  Note2 | dBm/15 kHz | 1, 2 | -102 | -102 |
|  | dB | 1, 2 | 8 | 8 | -3 | 8 |
| SS-RSRP Note3 | dBm/SCS | 1 | -85 | -85 | -96 | -85 |
|  |  | 2 | -82 | -82 | -93 | -82 |
| Io | dBm/95.04 MHz | 1 | -55.37 | -55.37 | -62.25 | -55.37 |
|  |  | 2 | -52.37 | -52.37 | -59.25 | -52.37 |
| TreselectionNR | s | 1, 2 | 0 | 0 |
| SnonintrasearchP | dB | 1, 2 | 50 | Not sent |
| SSearchDeltaP | dB | 1, 2 | 6 | 6 |
| TSearchDeltaP | s | 1, 2 | 300 | 300 |
| Threshx, high | dB | 1, 2 | 48 | 48 |
| Threshserving, low | dB | 1, 2 | 44 | 44 |
| Threshx, low  | dB | 1, 2 | 50 | 50 |
| Propagation Condition  |  | 1, 2 | 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation |

##### A.7.1.1.4.3 Test Requirements

The cell reselection delay to an already detected low priority cell (Cell 1) for UE fulfilling not-at-cell edge criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 79 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling not-at-cell edge criterion is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 139 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE 1: The cell re-selection delay to an already detected low priority cell can be expressed as: Tevaluate, NR\_ inter + TSI-NR

NOTE 2: The cell re-selection delay to an already detected higher priority cell can be expressed as: Thigher\_priority\_search + Tevaluate, NR\_ inter + TSI-NR

Where:

Tevaluate, NR\_ inter See Table 4.2.2.10.3-1 in clause 4.2.2.10.3

TSI-NR Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280ms is assumed in this test case.

This gives a total of 78.08 s, allow 79 s for the cell re-selection delay to an already detected low priority cell in the test case.

This gives a total of 138.08 s, allow 139 s for the cell re-selection delay to an already detected high priority cell in the test case.

------------------------------------------------------------- End of change #2 ------------------------------------------------------------