**3GPP TSG-RAN WG4 Meeting #104-e *R4-22xxxxx***

Online, 15th – 26th August, 2022

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **draftCR** | **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 for test case on HO with PSCell from EN-DC to EN-DC with target FR2 known PSCell | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RRM\_enh2\_Perf | | | | |  | ***Date:*** | | | 2022-8-24 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | draftCR for test case on HO with PSCell from EN-DC to EN-DC with source FR1 PSCell to target FR2 known PSCell | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Add test case on HO with PSCell from EN-DC to EN-DC with source FR1 PSCell to target FR2 known PSCell (TC10) | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Test case is missing for HO with PSCell from EN-DC to EN-DC with source FR1 PSCell to target FR2 known PSCell. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.5.3.x1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**< Start of change 1>**

A.5.3.x1 Handover with PSCell with known FR2 target PSCell

A.5.3.x1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell change delays in handover with PSCell from EN-DC to EN-DC are within the requirements stated in clause 5.8 of TS 36.133 [15] for the case when the source PSCell is in FR1 and the target PSCell in FR2 is known by the UE at the time of handover with PSCell.

Supported test configurations are shown in A.5.3.x1.1-1. The test parameters for the E-UTRA cells are given in Table A.3.7.2.2-1. The E-UTRA Cell 1 will handover to E-UTRA Cell 2 in this test case. The test parameters for NR cells are given in Tables A.5.3.x1.1-2, cell-specific parameters in A.5.3.x1.1-3 and OTA parameters in A.5.3.x1.1-4 below. The test consists of three successive time periods with duration of T1, T2 and T3. There are four carriers each with one cell. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on E-UTRA and Cell 4 (SCell) on NR. The UE is monitoring the PCell and PSCell.

The test system shall send a RRC message to the UE to handover with PSCell (target PCell Cell 2, target PSCell Cell 4). The RRC message (to handover with PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to handover with PSCell shall be sent to the UE during period T1. The point in time at which the RRC message to handover with PSCell (Cell2, Cell 4) is received at the UE antenna connector defines the start of period T2.

The test system shall observe the periodic reporting of CSI for the target PSCell during T3. The point in time at which the UE has sent PRACH to the target PSCell (Cell 4) defines the start of period T3.

**Table A.5.3.x1.1-1: Supported test configurations for Handover with PSCell**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | Cell 1 LTE FDD,  Cell 2 LTE FDD,  Cell 3 NR FDD 15kHz SSB SCS, 10MHz bandwidth,  Cell 4 NR TDD 120kHz SSB SCS, 100MHz bandwidth |
| 2 | Cell 1 LTE FDD,  Cell 2 LTE FDD,  Cell 3 NR TDD 15kHz SSB SCS, 10MHz bandwidth,  Cell 4 NR TDD 120kHz SSB SCS, 100MHz bandwidth |
| 3 | Cell 1 LTE FDD,  Cell 2 LTE FDD,  Cell 3 NR TDD 30kHz SSB SCS, 40MHz bandwidth,  Cell 4 NR TDD 120kHz SSB SCS, 100MHz bandwidth |
| 4 | Cell 1 LTE TDD,  Cell 2 LTE TDD,  Cell 3 NR FDD 15kHz SSB SCS, 10MHz bandwidth,  Cell 4 NR TDD 120kHz SSB SCS, 100MHz bandwidth |
| 5 | Cell 1 LTE TDD,  Cell 2 LTE TDD,  Cell 3 NR TDD 15kHz SSB SCS, 10MHz bandwidth,  Cell 4 NR TDD 120kHz SSB SCS, 100MHz bandwidth |
| 6 | Cell 1 LTE TDD,  Cell 2 LTE TDD,  Cell 3 NR TDD 30kHz SSB SCS, 40MHz bandwidth,  Cell 4 NR TDD 120kHz SSB SCS, 100MHz bandwidth |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.5.3.x1.1-2: General Test Parameters for Handover with PSCell**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| RF Channel Number | |  | 1, 2,3,4 | Two E-UTRAN radio channel (1,2) and two NR radio channel (3,4) are used for this test |
| Initial  Condition | Active PCell |  | Cell 1 | PCell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.1 |
| Neighbour Cell | Cell 2 | Neighbour cell on E-UTRAN RF channel number 2.  As specified in clause A.3.7.2.1 |
| Active PSCell | Cell 3 | PSCell on NR RF channel number 3. |
| Neighbour Cell | Cell 4 | Neighbour cell on NR RF channel number 4. |
| Final  Condition | Active PCell |  | Cell 2 |  |
| Neighbour Cell | Cell 1 |  |
| Active PSCell | Cell 4 |  |
| Neighbour Cell | Cell 3 |  |
| Access Barring Information | |  | Not Sent | No additional delays in random access procedure. |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| PRACH configuration on Cell 4 | |  | FR2 configuration 2 | Captured in A.3.8.3.2 |
| Cell-individual offset for cells on E-UTRAN RF channel | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on NR RF channel | | dB | 0 | Individual offset for cells on second component carrier |
| T1 | | s | 1 | During this time the PCell and PSCell shall be known and SCells configured and detected. |
| T2 | | s | 0.5 | During this time the UE change the PSCell. |
| T3 | | s | 1 | During this time the UE sends CSI reports for PSCell. |

**Table A.5.3.x1.1-3: Cell specific test parameters for Handover with PSCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 3** | | | **Cell 4** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| SSB ARFCN | |  | Freq1 | | | Freq2 | | |
| Duplex mode | Config 1,4 |  | FDD | | | TDD | | |
| Config 2,3,5,6 | TDD | | | TDD | | |
| TDD configuration | Config 1,4 |  | Not Applicable | | | TDDConf.3.1 | | |
| Config 2,5 | TDDConf.1.1 | | |
| Config 3,6 | TDDConf.2.1 | | |
| BWchannel | Config 1,4 | MHz | 10: NRB,c = 52 | | | 100: NRB,c = 66 | | |
| Config 2,5 | 10: NRB,c = 52 | | |
| Config 3,6 | 40: NRB,c = 106 | | |
| Data RBs allocated | Config 1,4 |  | 52 | | | 66 | | |
| Config 2,5 | 52 | | |
| Config 3,6 | 106 | | |
| DL initial BWP configuration | Config 1~6 |  | DLBWP.0.1 | | | | | |
| DL dedicated BWP configuration | Config 1~6 |  | DLBWP.1.1 | | | | | |
| UL initial BWP configuration | Config 1~6 |  | ULBWP.0.1 | | | | | |
| UL dedicated BWP configuration | Config 1~6 |  | ULBWP.1.1 | | | | | |
| DRX Cycle | | ms | Not Applicable | | | | | |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | | | SR.3.1 TDD | | |
| Config 2,5 | SR.1.1 TDD | | |
| Config 3,6 | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel | Config 1,4 |  | CR.1.1 FDD | | | CR.3.1 TDD | | |
| Config 2,5 | CR.1.1 TDD | | |
| Config 3,6 | CR.2.1 TDD | | |
| RMC CORESET Reference Channel | Config 1,4 |  | CCR.1.1 FDD | | | CCR.3.1 TDD | | |
| Config 2,5 | CCR.1.1 TDD | | |
| Config 3,6 | CCR.2.1 TDD | | |
| OCNG Patterns | |  | OP.1 | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| TCI state | |  | NA | | | TCI.State.0 | | |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD | | | TRS.2.1 TDD | | |
|  | Config 2,5 | TRS.1.1 TDD | | |
|  | Config 3,6 | TRS.1.2 TDD | | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | | SSB.1 FR2 | | |
|  | Config 3,6 | SSB.2 FR1 | | |
| CSI-RS configuration for CSI reporting | Config 1,4 |  | CSI-RS.1.1 FDD | | | CSI-RS.3.1 TDD | | |
| Config 2,5 | CSI-RS.1.1 TDD | | |
| Config 3,6 | CSI-RS.2.1 TDD | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | kHz | 15kHz | | | 120kHz | | |
| Config 3,6 | 30kHz | | |
| reportConfigType | Config 1~6 |  | N/A | | | Periodic | | |
| reportQuantity | Config 1~6 |  | N/A | | | cri-RI-PMI-CQI | | |
| CSI reporting periodicity | Config 1~6 | slot | N/A | | | 40 | | |
| CSI reporting offset | Config 1~6 | slot | N/A | | | 4 | | |
| EPRE ratio of PSS to SSS | | dB | 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) | |
| Propagation condition | |  | NA  Link only, see clause A.3.7A | | | 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. | | | | | | | | |

**Table A.5.3.x1.1-4: OTA related test parameters for Handover with PSCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 3** | | | **Cell 4** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration | |  | NA  Link only, see clause A.3.7A | | | Setup 1 according to clause A.3.15.1 | | |
| Assumption for UE beamsNote 5 | |  | Rough | | |
| Note1 | | dBm/15kHz | -104.7 | | |
| Note1 | Config 1,2,4,5 | dBm/SCS | -95.7 | | |
| Config 3,6 |
| SSB\_RPNote2 | Config 1,2,4,5 | dBm/SCS  Note3 | -88.7 | | |
| Config 3,6 |
|  | Config 1~12 | dB | 7 | | |
| Note2 | | dB | 7 | | |
| IoNote2 | Config 1~12 | dBm/ChBwNote3,Note4 | -58.92 | | |
| Note 1: 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 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 4: ChBW is 94.04 MHz for Cell4, 9.36 MHz for Cell 3 in configurations 1,2,4,5,7,8,10,11, 38.1 MHz in configurations 3,6,9,12.  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

A.5.3.x1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 107 msNote1 into T2.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T3.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T3

All the above test requirements shall be fulfilled for the observed PSCell change delay to be counted as correct. The rate of correct observed PSCell change delay during repeated tests shall be at least 90%.

Note1: The PSCell change delay can be expressed as follows as specified in clause 5.8.1.2 of TS 36.133 [15]:

DHOwithPSCel\_PSCell = TRRC\_delay + Tprocessing + Tsearch + T∆ + TPSCell\_ DU + TPCell\_DU + 2 ms

Where:

TRRC\_delay = 20 ms

Tprocessing = 45 ms

Tsearch = 0 ms

T∆ = 20 ms

TPSCell\_ DU = 1\*10+10 = 20 ms

TPCell\_ DU = 0 ms

**< End of change 1>**